

# FR328S ProSafe Firewall with Dial Back-Up Reference Manual v2



## NETGEAR

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## **Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## **EN 55 022 Declaration of Conformance**

This is to certify that the FR328S ProSafe Firewall with Dial Back-Up is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

## **Bestätigung des Herstellers/Importeurs**

Es wird hiermit bestätigt, daß das FR328S ProSafe Firewall with Dial Back-Up gemäß der im BMPT-AmtsblVfg 243/1991 und Vfg 46/1992 aufgeführten Bestimmungen entstört ist. Das vorschriftsmäßige Betreiben einiger Geräte (z.B. Testsender) kann jedoch gewissen Beschränkungen unterliegen. Lesen Sie dazu bitte die Anmerkungen in der Betriebsanleitung.

Das Bundesamt für Zulassungen in der Telekommunikation wurde davon unterrichtet, daß dieses Gerät auf den Markt gebracht wurde und es ist berechtigt, die Serie auf die Erfüllung der Vorschriften hin zu überprüfen.

## **Certificate of the Manufacturer/Importer**

It is hereby certified that the FR328S ProSafe Firewall with Dial Back-Up has been suppressed in accordance with the conditions set out in the BMPT-AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject to certain restrictions. Please refer to the notes in the operating instructions.

Federal Office for Telecommunications Approvals has been notified of the placing of this equipment on the market and has been granted the right to test the series for compliance with the regulations.

## **Voluntary Control Council for Interference (VCCI) Statement**

This equipment is in the second category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential areas.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read instructions for correct handling.

## **Technical Support**

Refer to the Support Information Card that shipped with your FR328S ProSafe Firewall with Dial Back-Up.

## **World Wide Web**

NETGEAR maintains a World Wide Web home page that you can access at the universal resource locator (URL) <http://www.netgear.com>. A direct connection to the Internet and a Web browser such as Internet Explorer or Netscape are required.



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# Chapter 1

## About This Manual

Thank you for purchasing the NETGEAR™ FR328S ProSafe Firewall with Dial Back-Up. This chapter describes the target audience, versions, conventions, and features of this manual.

### Audience, Versions, Conventions

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This reference manual assumes that the reader has basic to intermediate computer and Internet skills. However, basic computer network, Internet, and firewall technologies tutorial information is provided in the Appendices and on the Netgear website.

This guide uses the following formats to highlight special messages:



**Note:** This format is used to highlight information of importance or special interest.

This manual is written for the FR328S Firewall according to these versions.:

**Table 1-1. Product, Firmware Version, Manual Version, and Publication Date**

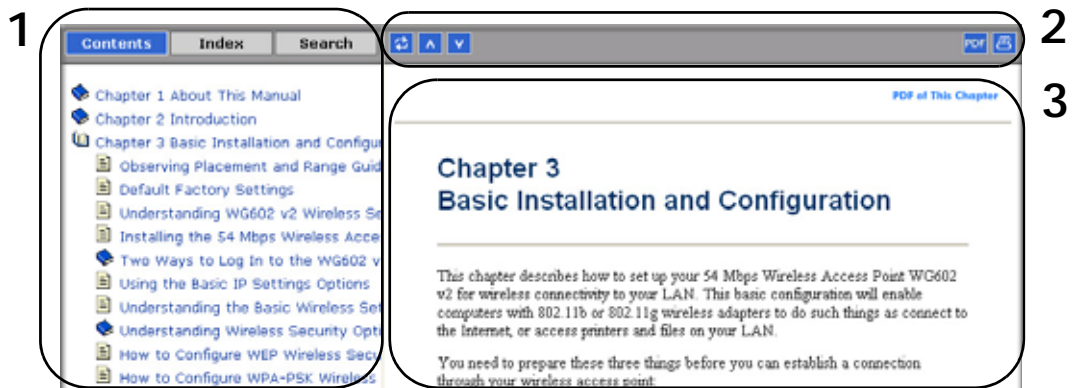
Product	FR328S ProSafe Firewall with Dial Back-Up
Firmware Version Number	Version 1.4 Release 05
Manual Part Number	M-10207-01, Reference Manual v2
Manual Publication Date	October 2003



**Note:** Product updates are available on the NETGEAR, Inc. web site at <http://www.netgear.com/support/main.asp>. Documentation updates are available on the NETGEAR, Inc. web site at <http://www.netgear.com/docs>.

## How to Use this Manual

The HTML version of this manual includes a variety of navigation features as well as links to PDF versions of the full manual and individual chapters.



**Figure Preface -2: HTML version of this manual**

1. **Left pane.** Use the left pane to view the Contents, Index, Search, and Favorites tabs.

To view the HTML version of the manual, you must have a version 4 or later browser with JavaScript enabled.

2. **Toolbar buttons.** Use the toolbar buttons across the top to navigate, print pages, and more.



The Show in Contents button locates the current topic in the Contents tab.



Previous/Next buttons display the previous or next topic.



The PDF button links to a PDF version of the full manual.





The Print button prints the current topic. Using this button when a step-by-step procedure is displayed will send the entire procedure to your printer--you do not have to worry about specifying the correct range of pages.

3. **Right pane.** Use the right pane to view the contents of the manual. Also, each page of the manual includes a [PDF of This Chapter](#) link at the top right which links to a PDF file containing just the currently selected chapter of the manual.

## How to Print this Manual

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To print this manual you can choose one of the following several options, according to your needs.

- **Printing a “How To” Sequence of Steps in the HTML View.** Use the *Print* button  on the upper right of the toolbar to print the currently displayed topic. Using this button when a step-by-step procedure is displayed will send the entire procedure to your printer--you do not have to worry about specifying the correct range of pages.
- **Printing a Chapter.** Use the [PDF of This Chapter](#) link at the top right of any page.
  - Click “PDF of This Chapter” link at the top right of any page in the chapter you want to print. The PDF version of the chapter you were viewing opens in a browser window.  
**Note:** Your computer must have the free Adobe Acrobat reader installed in order to view and print PDF files. The Acrobat reader is available on the Adobe web site at <http://www.adobe.com>.
  - Click the print icon in the upper left of the window.  
**Tip:** If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.
- **Printing the Full Manual.** Use the PDF button in the toolbar at the top right of the browser window.
  - Click the PDF button  on the upper right of the toolbar. The PDF version of the chapter you were viewing opens in a browser window.
  - Click the print icon in the upper left of the window.  
**Tip:** If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.



# Chapter 2

## Introduction

This chapter describes the features of the NETGEAR FR328S ProSafe Firewall with Dial Back-Up.

The FR328S is a complete security solution that protects your network from attacks and intrusions. Unlike simple Internet sharing routers that rely on Network Address Translation (NAT) for security, the FR328S uses Stateful Packet Inspection for Denial of Service (DoS) attack protection and intrusion detection. The 8-port FR328S with auto fail-over connectivity through the serial port provides highly reliable Internet access for up to 253 users.

### Key Features

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The FR328S offers the following key features.

- Full routing capabilities on both the broadband and serial ports, enabling Internet access via either the serial or broadband ports.
- A powerful true firewall with comprehensive content filtering options.
- Extensive protocol support.
- Configurable Auto Uplink™ Ethernet Connections.
- Easy installation and management.

These features are discussed below.

### Full Routing on Both the Broadband and Serial Ports

You can install, configure, and operate the FR328S to take full advantage of a variety of routing options on both the serial and broadband WAN ports, including:

- Internet access via either the serial or broadband port.
- Auto fail-over connectivity through an analog or ISDN modem connected to the serial port. If the broadband Internet connection fails, after a waiting for an amount of time you specify, the FR328S can automatically establish a backup ISDN or dial-up Internet connection via the serial port on the firewall.

- Remote Access Server (RAS) allows you to log in remotely through the serial port to access a server on your LAN, other LAN resources, or the Internet based on a user name and password you define.
- LAN-to-LAN access between two FR328S firewalls through the serial port with the option of enabling auto-failover Internet access across the serial LAN-to-LAN connection.

## A Powerful, True Firewall with Comprehensive Content Filtering

Unlike simple Internet sharing NAT routers, the FR328S is a true firewall, using stateful packet inspection to defend against hacker attacks. Its firewall features include:

- Denial of Service (DoS) protection  
Automatically detects and thwarts Denial of Service (DoS) attacks such as Ping of Death, SYN Flood, LAND Attack and IP Spoofing.
- Blocks unwanted traffic from the Internet to your LAN.
- Blocks access from your LAN to Internet locations or services that you specify as off-limits.
- Logs security incidents  
The FR328S will log security events such as blocked incoming traffic, port scans, attacks, and administrator logins. You can configure the firewall to email the log to you at specified intervals. You can also configure the firewall to send immediate alert messages to your email address or email pager whenever a significant event occurs.
- With its content filtering feature, the FR328S prevents objectionable content from reaching your PCs. The firewall allows you to control access to Internet content by screening for keywords within Web addresses. You can configure the firewall to log and report attempts to access objectionable Internet sites.

## Protocol Support

The FR328S supports the Transmission Control Protocol/Internet Protocol (TCP/IP) and Routing Information Protocol (RIP). [Appendix B, “Networks, Routing, and Firewall Basics”](#) provides further information on TCP/IP.

- The Ability to Enable or Disable IP Address Sharing by NAT  
The FR328S allows several networked PCs to share an Internet account using only a single IP address, which may be statically or dynamically assigned by your Internet service provider (ISP). This technique, known as NAT, allows the use of an inexpensive single-user ISP account. This feature can also be turned off completely for using the FR328S in settings where you want to manage the IP address scheme of your organization.



- **Automatic Configuration of Attached PCs by DHCP**  
The FR328S dynamically assigns network configuration information, including IP, gateway, and domain name server (DNS) addresses, to attached PCs on the LAN using the Dynamic Host Configuration Protocol (DHCP). This feature greatly simplifies configuration of PCs on your local network.
- **DNS Proxy**  
When DHCP is enabled and no DNS addresses are specified, the firewall provides its own address as a DNS server to the attached PCs. The firewall obtains actual DNS addresses from the ISP during connection setup and forwards DNS requests from the LAN.
- **PPP over Ethernet (PPPoE)**  
PPP over Ethernet is a protocol for connecting remote hosts to the Internet over a DSL connection by simulating a dial-up connection. This feature eliminates the need to run a login program such as EnterNet or WinPOET on your PC.
- **PPTP login support for European ISPs, BigPond login for Telstra DSL in Australia.**
- **Dynamic DNS**  
Dynamic DNS services allow remote users to find your network using a domain name when your IP address is not permanently assigned. The firewall contains a client that can connect to many popular Dynamic DNS services to register your dynamic IP address.

## **Configurable Auto Uplink™ Ethernet Connection**

With its internal 8-port 10/100 switch, the FR328S can connect to either a 10 Mbps standard Ethernet network or a 100 Mbps Fast Ethernet network. Both the local LAN and the Internet WAN interfaces are autosensing and capable of full-duplex or half-duplex operation.

The firewall incorporates Auto Uplink™ technology. Each LOCAL Ethernet port will automatically sense whether the Ethernet cable plugged into the port should have a ‘normal’ connection such as to a PC or an ‘uplink’ connection such as to a switch or hub. That port will then configure itself to the correct configuration. This feature also eliminates the need to worry about crossover cables, as Auto Uplink will accommodate either type of cable to make the right connection.

## **Easy Installation and Management**

You can install, configure, and operate the FR328S within minutes after connecting it to the network. The following features simplify installation and management tasks:

- **Browser-based management**  
Browser-based configuration allows you to easily configure your firewall from almost any type of personal computer, such as Windows, Macintosh, or Linux. A user-friendly Setup Wizard is provided and online help documentation is built into the browser-based interface.
- **Remote management**  
The firewall allows you to log in to the browser-based management interface from a remote location via the Internet using SSL encryption. For security, you can limit remote management access to a specified remote IP address or range of addresses, and you can choose a nonstandard port number.
- **Smart Wizard**  
The firewall automatically senses the type of Internet connection, asking you only for the information required for your type of ISP account.
- **Diagnostic functions**  
The firewall incorporates built-in diagnostic functions such as Ping, DNS lookup, and remote reboot. These functions allow you to test Internet connectivity and reboot the firewall. You can use these diagnostic functions directly from the FR328S when you are connected on the LAN or when you are connected over the Internet via the remote management function.
- **Visual monitoring**  
The firewall's front panel LEDs provide an easy way to monitor its status and activity.
- **Flash EPROM for firmware upgrade**

## What's in the Box?

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The product package should contain the following items:

- FR328S ProSafe Firewall with Dial Back-Up
- AC power adapter
- Category 5 (CAT5) Ethernet cable
- *Resource CD (SW-10045-01)*, including:
  - This manual
  - Application Notes, Tools, and other helpful information
- Warranty and registration card
- Support information card

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Keep the carton, including the original packing materials, in case you need to return the product for repair.

## The Firewall's Front Panel

The front panel of the FR328S ([Figure 2-1](#)) contains status LEDs.



**Figure 2-1: FR328S Front Panel**

You can use some of the LEDs to verify connections. [Table 2-1](#) lists and describes each LED on the front panel of the firewall.

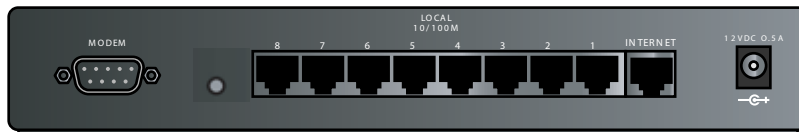
These LEDs are green when lit, except for the TEST LED, which is amber.

**Table 2-1: LED Descriptions**

Label	Activity	Description
POWER	On	Power is supplied to the firewall.
TEST	On Off	The system is initializing. The system is ready and running.
MODEM	On/Blinking	The port detected a link with the Internet WAN connection or Remote Access Server. Blinking indicates data transmission.
INTERNET 100 LINK/ACT (Activity)	On/Blinking On/Blinking	The Internet port is operating at 100 Mbps. The port detected a link with the Internet WAN connection and is operating at 10 Mbps. Blinking indicates data transmission.
LOCAL 100 LINK/ACT (Link/Activity)	On/Blinking On/Blinking	The Local port is operating at 100 Mbps. The Local port has detected a link with a LAN connection and is operating at 10 Mbps. Blinking indicates data transmission.

## The Firewall's Rear Panel

The rear panel of the FR328S (Figure 2-2) contains the connections identified below.



**Figure 2-2: FR328S Rear Panel**

Viewed from left to right, the rear panel contains the following elements:

- DB-9 serial port for modem connection
- Factory Default Reset push button
- Eight Local Ethernet RJ-45 ports for connecting the firewall to the local computers
- Internet WAN Ethernet RJ-45 port for connecting the firewall to a cable or DSL modem
- 12V DC 1.2A power adapter input

# Chapter 3

## Connecting the Firewall to the Internet

This chapter describes how to set up the firewall on your Local Area Network (LAN), connect to the Internet, perform basic configuration of your FR328S ProSafe Firewall with Dial Back-Up using the Setup Wizard, or how to manually configure your Internet connection.

### What You Will Need Before You Begin

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You need to prepare these three things before you can connect your firewall to the Internet:

1. A computer properly connected to the firewall as explained below.
2. Active Internet service such as that provided by a DSL or Cable modem account.
3. The Internet Service Provider (ISP) configuration information for your DSL or Cable modem account.

### Hardware Requirements

The FR328S Firewall connects to your LAN via twisted-pair Ethernet cables. To use the FR328S Firewall on your network, each computer must have an installed Ethernet Network Interface Card (NIC) and an Ethernet cable. If the computer will connect to your network at 100 Mbps, you must use a Category 5 (CAT5) cable such as the one provided with your firewall. For more on CAT5 cabling, please see [“Ethernet Cabling“ on page B-11](#).

The broadband modem must provide a standard 10 Mbps 10BASE-T or 100 Mbps 100BASE-T Ethernet interface.

The serial modem must have the standard serial modem interface and cable with a DB-9 connector as illustrated in [“FR328S Rear Panel“ on page 2-6](#).

## Configuration Requirements

For the initial connection to the Internet and configuration of your firewall, you will need to connect a computer to the firewall which is set to automatically get its TCP/IP configuration from the firewall via DHCP.

**Note:** For assistance with DHCP configuration, please refer to the animated Windows TCP/IP Configuration Tutorials on the *Resource CD (SW-10045-01)* or in [Appendix C, "Preparing Your Network"](#).

## Internet Configuration Requirements

Depending on how your ISP set up your Internet account, you will need one or more of these configuration parameters to connect your firewall to the Internet:

- Host and Domain Names
- ISP Login Name and Password
- ISP Domain Name Server (DNS) Addresses
- Fixed or Static IP Address

### Where Do I Get the Internet Configuration Parameters?

There are several ways you can gather the required Internet connection information.

- Your ISP should have provided you with all the information needed to connect to the Internet. If you cannot locate this information, you can ask your ISP to provide it or you can try one of the options below.
- If you have a computer already connected using the active Internet access account, you can gather the configuration information from that computer.
  - For Windows 95/98/ME, open the Network control panel, select the TCP/IP entry for the Ethernet adapter, and click Properties.
  - For Windows 2000/XP, open the Local Area Network Connection, select the TCP/IP entry for the Ethernet adapter, and click Properties.
  - For Macintosh computers, open the TCP/IP or Network control panel.
- You may also refer to the *FR328S Resource CD* for the NETGEAR Router ISP Guide which provides Internet connection information for many ISPs.

Once you locate your Internet configuration parameters, you may want to record them on the page below according to the instructions in ["Record Your Internet Connection Information"](#) on [page 3-3](#).

## Record Your Internet Connection Information

Print this page. Fill in the configuration parameters from your Internet Service Provider (ISP).

**ISP Login Name:** The login name and password are case sensitive and must be entered exactly as given by your ISP. Some ISPs use your full e-mail address as the login name. The Service Name is not required by all ISPs. If you connect using a login name and password, then fill in the following:

Login Name: \_\_\_\_\_ Password: \_\_\_\_\_

Service Name: \_\_\_\_\_

**Fixed or Static IP Address:** If you have a static IP address, record the following information. For example, 169.254.141.148 could be a valid IP address.

Fixed or Static Internet IP Address: \_\_\_\_\_

Subnet Mask: \_\_\_\_\_

Gateway IP Address: \_\_\_\_\_

**ISP DNS Server Addresses:** If you were given DNS server addresses, fill in the following:

Primary DNS Server IP Address: \_\_\_\_\_

Secondary DNS Server IP Address: \_\_\_\_\_

**Host and Domain Names:** Some ISPs use a specific host or domain name like **CCA7324-A** or **home**. If you haven't been given host or domain names, you can use the following examples as a guide:

- If your main e-mail account with your ISP is **aaa@yyy.com**, then use **aaa** as your host name. Your ISP might call this your account, user, host, computer, or system name.
- If your ISP's mail server is **mail.xxx.yyy.com**, then use **xxx.yyy.com** as the domain name.

ISP Host Name: \_\_\_\_\_ ISP Domain Name: \_\_\_\_\_

**For Serial Port Internet Access:** If you use a dial-up account, record the following:

Account/User Name: \_\_\_\_\_ Password: \_\_\_\_\_

Telephone number: \_\_\_\_\_ Alternative number: \_\_\_\_\_

## Connecting the FR328S Firewall to Your LAN

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This section provides instructions for connecting the FR328S ProSafe Firewall with Dial Back-Up to your Local Area Network (LAN).

**Note:** The Resource CD included with your firewall contains an animated Installation Assistant to guide you through this procedure.

### How to Connect the Firewall to Your LAN

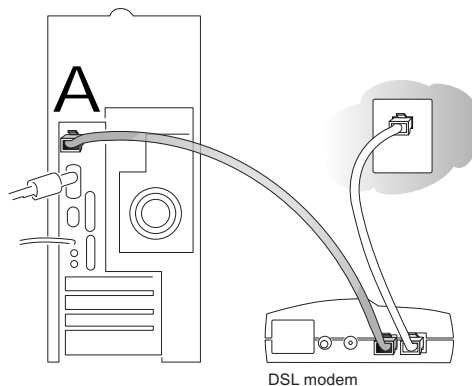
There are three steps to connecting your firewall:

1. Connect the firewall to your network.
2. Log in to the firewall.
3. Connect to the Internet.

Follow the steps below to connect your firewall to your network. You can also refer to the Resource CD included with your firewall which contains an animated Installation Assistant to help you through this procedure.

#### 1. Connect the Firewall

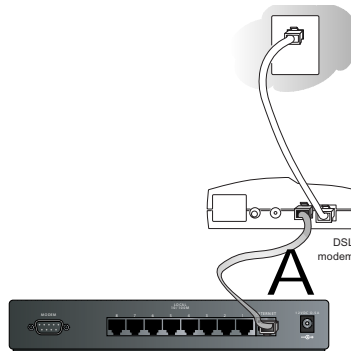
- a. Turn off your computer and Cable or DSL Modem.
- b. Disconnect the Ethernet cable (A) from your computer which connects to your Cable or DSL modem.



**Figure 3-1: Disconnect the Cable or DSL Modem**

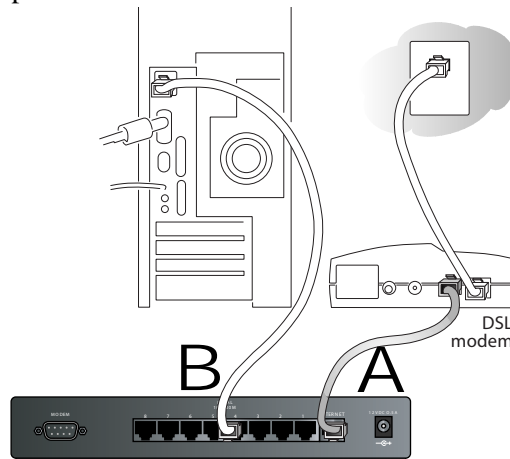


- c. Connect the Ethernet cable (**A**) from your Cable or DSL modem to the FR328S's Internet port.



**Figure 3-2: Connect the Cable or DSL Modem to the firewall**

- d. Connect the Ethernet cable (**B**) which came with the firewall from a Local port on the router to your computer.



**Figure 3-3: Connect the computers on your network to the firewall**

**Note:** The FR328S Firewall incorporates Auto Uplink™ technology. Each LOCAL Ethernet port will automatically sense whether the cable plugged into the port should have a 'normal' connection (e.g. connecting to a PC) or an 'uplink' connection (e.g. connecting to a switch or hub). That port will then configure itself to the correct configuration. This feature also eliminates the need to worry about crossover cables, as Auto Uplink will accommodate either type of cable to make the right connection.

- e. Turn on the Cable or DSL modem and wait about 30 seconds for the lights to stop blinking.

## 2. Log in to the Firewall

**Note:** To connect to the firewall, your computer needs to be configured to obtain an IP address automatically via DHCP. Please refer to [Appendix C, "Preparing Your Network"](#) for instructions on how to do this.

- a. Turn on the firewall and wait for the Test light to stop blinking.
- b. Now, turn on your computer.

**Note:** If you usually run software to log in to your Internet connection, do not run that software.

Now that the Cable or DSL Modem, firewall, and the computer are turned on, verify the following:

- When power on the firewall was first turned on, the PWR light went on, the TEST light turned on within a few seconds, and then went off after approximately 10 seconds.
  - The firewall's LOCAL LINK/ACT lights are lit for any computers that are connected to it.
  - The firewall's INTERNET LINK light is lit, indicating a link has been established to the cable or DSL modem.
- c. Next, use a browser like Internet Explorer or Netscape to log in to the firewall at its default address of `http://192.168.0.1`.



**Figure 3-4: Log in to the firewall**

A login window opens as shown in [Figure 3-5](#) below:

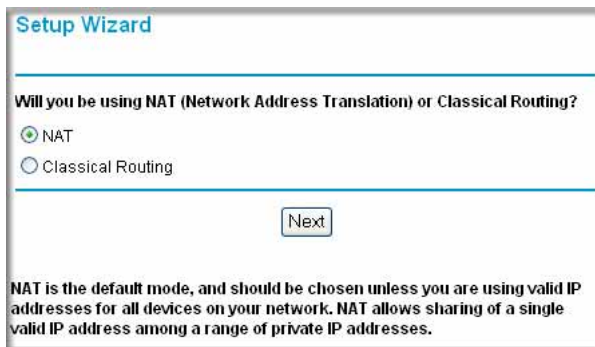


**Figure 3-5: Login window**

- d. For security reasons, the firewall has its own user name and password. When prompted, enter **admin** for the firewall User Name and **password** for the firewall Password, both in lower case letters.

**Note:** The user name and password are not the same as any user name or password you may use to log in to your Internet connection.

### 3. Connect to the Internet



**Figure 3-6: Setup Wizard**

- a. You are now connected to the firewall. If you do not see the menu above, click the Setup Wizard link on the upper left of the main menu.

- b. Select the NAT option and click Next to follow the steps in the Setup Wizard to input the configuration parameters from your ISP to connect to the Internet. If you choose not to use NAT, each computer on the LAN connected to the FR328S must have a valid public IP address in the same subnet as the Wan port of the FR328S. For more information on NAT, please see [“Single IP Address Operation Using NAT”](#) on page B-8

If you were unable to connect to the firewall, please refer to [Troubleshooting “Basic Functions”](#) on page 8-1.

## Connecting the FR328S Firewall to the Internet

---

You are now ready to configure your firewall to connect to the Internet. There are two ways you can configure your firewall to connect to the Internet:

- Let the FR328S auto-detect the type of Internet connection you have and configure it.
- Manually choose which type of Internet connection you have and configure it.

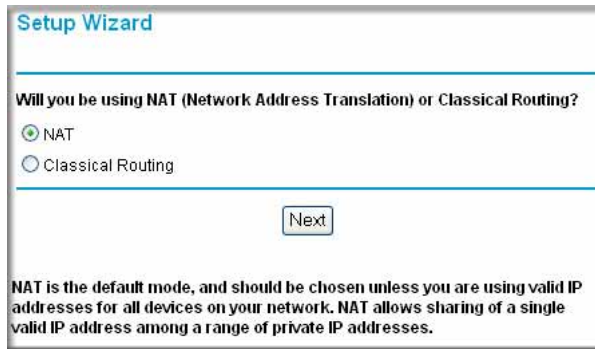
These options are described below. Unless your ISP uses DHCP, you will need the parameters from your ISP you recorded in [“Record Your Internet Connection Information”](#) on page 3-3.

### How to Auto-Detect Your Internet Connection Type

The Web Configuration Manager built in to the firewall contains a Setup Wizard that can automatically determine your network connection type.

1. If your firewall has not yet been configured, the Setup Wizard should launch automatically.

When the Wizard launches, select Yes in the menu below to allow the firewall to automatically determine your connection.



Setup Wizard

Will you be using NAT (Network Address Translation) or Classical Routing?

NAT

Classical Routing

Next

NAT is the default mode, and should be chosen unless you are using valid IP addresses for all devices on your network. NAT allows sharing of a single valid IP address among a range of private IP addresses.

**Figure 3-7: Setup Wizard**

**Note:** If you do not see the Setup Wizard, click the Setup Wizard link in the upper left to bring up this menu.

2. Click **Next**

The Setup Wizard will now check for the following connection types:

- Dynamic IP assignment
- A login protocol such as PPPoE
- Fixed IP address assignment

Next, the Setup Wizard will report which connection type it has discovered, and then display the appropriate configuration menu. If the Setup Wizard finds no connection, you will be prompted to check the physical connection between your firewall and the cable or DSL modem. When the connection is properly made, the firewall's Internet LED should be on.

The procedures for filling in the configuration menu for each type of connection follow below.

## How to Complete the Wizard-Detected Login Account Setup

If the Setup Wizard determines that your Internet service account uses a login protocol such as PPP over Ethernet (PPPoE), you will be directed to a menu like the PPPoE menu in [Figure 3-8](#):



The screenshot shows a configuration window titled "PPPoE". It has several sections:

- Account Name**: A text input field.
- Domain Name**: A text input field.
- Login**: A text input field.
- Password**: A text input field.
- Idle Timeout**: A numeric input field with the value "5".
- Domain Name Server (DNS) Address**: A section with two radio buttons:
  - Get automatically from ISP
  - Use these DNS servers
- Below the radio buttons are two text input fields:
  - Primary DNS**
  - Secondary DNS**
- At the bottom are three buttons: **Apply**, **Cancel**, and **Test**.

**Figure 3-8: Setup Wizard menu for PPPoE login accounts**

1. Enter your Account Name (may also be called Host Name) and Domain Name. These parameters may be necessary to access your ISP's services such as mail or news servers. If you leave the Domain Name field blank, the firewall will attempt to learn the domain automatically from the ISP. If this is not successful, you may need to enter it manually.
2. Enter the PPPoE login user name and password provided by your ISP. These fields are case sensitive. If you wish to change the login timeout, enter a new value in minutes.

**Note:** You will no longer need to launch the ISP's login program on your PC in order to access the Internet. When you start an Internet application, your firewall will automatically log you in.

3. Domain Name Server (DNS) Address: If you know that your ISP does not automatically transmit DNS addresses to the firewall during login, select "Use these DNS servers" and enter the IP address of your ISP's Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

**Note:** If you enter an address here, after you finish configuring the firewall, reboot your PCs so that the settings take effect.

4. Click **Apply** to save your settings.
5. Click **Test** to test your Internet connection. If the NETGEAR website does not appear within one minute, refer to [Chapter 8, Troubleshooting](#)”.

## How to Complete the Wizard-Detected Dynamic IP Account Setup

If the Setup Wizard determines that your Internet service account uses Dynamic IP assignment, you will be directed to the menu shown in [Figure 3-9](#) below:

**Figure 3-9: Setup Wizard menu for Dynamic IP address**

1. Enter your Account Name (may also be called Host Name) and Domain Name. These parameters may be necessary to access your ISP’s services such as mail or news servers. If you leave the Domain Name field blank, the firewall will attempt to learn the domain automatically from the ISP. If this is not successful, you may need to enter it manually.
2. If you know that your ISP does not automatically transmit DNS addresses to the firewall during login, select “Use these DNS servers” and enter the IP address of your ISP’s Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

**Note:** DNS servers are required to perform the function of translating an Internet name such as [www.netgear.com](http://www.netgear.com) to a numeric IP address. For a fixed IP address configuration, you must obtain DNS server addresses from your ISP and enter them manually here. You should reboot your PCs after configuring the firewall for these settings to take effect.

- The Router's MAC Address is the Ethernet MAC address that will be used by the firewall on the Internet port.

If your ISP allows access from only one specific computer's Ethernet MAC address, select "Use this MAC address." The firewall will then capture and use the MAC address of the computer that you are now using. You must be using the one computer that is allowed by the ISP. Otherwise, you can type in a MAC address.

**Note:** Some ISPs will register the Ethernet MAC address of the network interface card in your PC when your account is first opened. They will then only accept traffic from the MAC address of that PC. This feature allows your firewall to masquerade as that PC by using its MAC address.

- Click **Apply** to save your settings.
- Click **Test** to test your Internet connection. If the NETGEAR website does not appear within one minute, refer to [Chapter 8, Troubleshooting](#)".

## How to Complete Wizard-Detected Fixed IP Account Setup

If the Setup Wizard determines that your Internet service account uses Fixed IP assignment, you will be directed to the menu shown in [Figure 3-10](#) below:

Fixed IP				
<b>Internet IP Address</b>				
IP Address	0	0	0	0
IP Subnet Mask	255	255	255	0
Gateway IP Address	0	0	0	0
<b>Domain Name Server (DNS) Address</b>				
Primary DNS	0	0	0	0
Secondary DNS	0	0	0	0
Apply Cancel Test				

**Figure 3-10: Setup Wizard menu for Fixed IP address**



1. Enter your assigned IP Address, Subnet Mask, and the IP Address of your ISP's gateway router. This information should have been provided to you by your ISP. You will need the configuration parameters from your ISP you recorded in ["Record Your Internet Connection Information"](#) on page 3-3.
2. Enter the IP address of your ISP's Primary DNS Server. If a Secondary DNS Server address is available, enter it also.

**Note:** DNS servers are required to perform the function of translating an Internet name such as [www.netgear.com](http://www.netgear.com) to a numeric IP address. For a fixed IP address configuration, you must obtain DNS server addresses from your ISP and enter them manually here. You should reboot your PCs after configuring the firewall for these settings to take effect.

3. Click **Apply** to save the settings.
4. Click **Test** to test your Internet connection. If the NETGEAR website does not appear within one minute, refer to [Chapter 8, Troubleshooting](#).

## **Configuring a Serial Port as the Primary Internet Connection**

---

Use the procedure below to configure an Internet connection via the serial port of your firewall.

### **How to Configure the Serial Port for an Internet Connection**

There are three steps to configuring the serial port of your firewall for an Internet connection:

1. Connect the firewall to your ISDN or dial-up analog modem
2. Configure the firewall
3. Connect to the Internet

Follow the steps below to configure a serial port Internet connection on your firewall.

1. **Connect the Firewall to your ISDN or dial-up modem**
  - a. Turn off your modem and connect the cable from the serial port of the FR328S to the modem.
  - b. Turn on the modem and wait about 30 seconds for the lights to stop blinking.
2. **Configure the Serial Port of the Firewall.**
  - a. Use a browser to log in to the firewall at <http://192.168.0.1> with its default User Name of **admin** and default Password of **password**, or using whatever Password you have set up.

- b. From the Setup Basic Settings menu, click Serial Port.

The screenshot shows the 'Basic Settings' configuration window. It is divided into several sections:

- What type of Internet Connection do you have ?**
  - Broadband - No login
  - Broadband with Login (username, password)
  - Serial Port (Modem or ISDN)
- Dial-up Account**
  - Account/User Name:
  - Password:
  - Telephone:
  - Alternative Telephone:
  - Connect as required
  - Disconnect after Idle Time of  min
- Internet IP Address:**
  - Get Dynamically From ISP
  - Use Static IP Address:  .  .  .
- DNS IP Address:**
  - Get Automatically From ISP
  - Use These DNS Servers
    - Primary DNS:  .  .  .
    - Secondary DNS:  .  .  .
- Modem:**
  - Serial Line Speed:  bps
  - Modem Type:

At the bottom, there are 'Apply' and 'Cancel' buttons.

**Figure 3-11: Serial Internet Connection configuration menu**

- c. Fill in the ISDN or analog ISP Internet configuration parameters as appropriate:
- For a Dial-up Account, enter the Account information. Check “Connect as required” to enable the firewall to automatically dial the number. To enable Idle Time disconnect, check the box and enter a time in minutes.
  - To configure the Internet IP settings, fill in the address parameters your ISP provided.
- d. Configure the Modem parameters.

**Note:** You can validate modem string settings by first connecting the modem directly to a PC, establishing a connection to your ISP, and then copying the modem string settings from the PC configuration and pasting them into the FR328S Modem Properties Initial String field. For more information on this procedure, please refer to the support area of the NETGEAR web site.

- Select the Serial Line Speed. This is the maximum speed the modem will attempt to use. For ISDN permanent connections, the speeds are typically 64000 or 128000 bps. For dial-up modems, 56000 bps would be a typical setting.
- Select the Modem Type.
  - For ISDN, select “Permanent connection (leased line).”
  - For dial-up, select your modem from the list. “Standard Modem” should work in most cases.
  - If your modem is not on the list, select “User Defined” and enter the Modem Properties.

**Note:** If you are not using modem from the pre-defined list but are using the “User Defined” Modem Type, you must first use the Serial Port menu Modem link to fill in the Modem Properties settings for your modem.

e. Click **Apply** to save your settings.

### 3. **Connect to the Internet to test your configuration.**

- a. If you have a broadband connection, disconnect it.
- b. From a workstation, open a browser and test your serial port Internet connection.

**Note:** The response time of your serial port Internet connection will be slower than a broadband Internet connection.

## Testing Your Internet Connection

---

After completing the Internet connection configuration, you can test your Internet connection. Log in to the firewall, then, from the Setup Basic Settings link, click on the Test button. If the NETGEAR website does not appear within one minute, refer to [Chapter 8, Troubleshooting](#).

To access the Internet from any computer connected to your firewall, launch a browser such as Microsoft Internet Explorer or Netscape Navigator. You should see the firewall’s Internet LED blink, indicating communication to the ISP. The browser should begin to display a Web page.

The following chapters describe how to configure the Advanced features of your firewall, and how to troubleshoot problems that may occur.

## Manually Configuring Your Internet Connection

You can manually configure your firewall using the menu below, or you can allow the Setup Wizard to determine your configuration as described in the previous section.

### ISP Does Not Require Login

**Basic Settings**

---

**What type of Internet Connection do you have ?**

Broadband - No login

Broadband with Login (username, password)

Serial Port (Modem or ISDN)

---

Account Name (If Required)

Domain Name (If Required)

---

**NAT (Network Address Translation)**

Enable  Disable

---

**Internet IP Address**

Get Dynamically From ISP

Use Static IP Address

IP Address

IP Subnet Mask

Gateway IP Address

---

**Domain Name Server (DNS) Address**

Get Automatically From ISP

Use These DNS Servers

Primary DNS

Secondary DNS

---

**Router's MAC Address**

Use Default Address

Use This Computer's MAC

Use This MAC Address

---

### ISP Does Require Login

**Basic Settings**

---

**What type of Internet Connection do you have ?**

Broadband - No login

Broadband with Login (username, password)

Serial Port (Modem or ISDN)

---

Internet Service Provider Name

Account Name

Domain Name

---

Login

Password

Idle Timeout  Minutes

---

**Domain Name Server (DNS) Address**

Get Automatically From ISP

Use These DNS Servers

Primary DNS

Secondary DNS

---

**Router's MAC Address**

Use Default Address

Use This Computer's MAC

Use This MAC Address

---

Figure 3-12: Browser-based configuration Basic Settings menu

## How to Manually Configure the Primary Internet Connection

Use these steps to manually configure the primary Internet connection in the Basic Settings menu.

1. Select your Internet connection type (broadband with or without login, or serial).

**Note:** If you are a Telstra BigPond broadband customer, or if you are in an area such as Austria that uses broadband PPTP, login is required. If so, select BigPond or PPTP from the Internet Service Type drop down box.

2. Enter your Account Name (may also be called Host Name) and Domain Name. These parameters may be necessary to access your ISP's services such as mail or news servers.
3. If needed, enter the PPPoE login user name and password provided by your ISP. These fields are case sensitive. To change the login timeout, enter a new value in minutes.

**Note:** You will no longer need to run the ISP's login program on your PC in order to access the Internet. When you start an Internet application, your firewall automatically logs you in.

4. Internet IP Address: If your ISP assigned you a permanent, fixed IP address for your PC, select "Use static IP address." Enter the IP address your ISP assigned. Also enter the netmask and the Gateway IP address. The Gateway is the ISP's router to which your firewall will connect.
5. Domain Name Server (DNS) Address: If your ISP does not automatically transmit DNS addresses to the firewall during login, select "Use these DNS servers" and enter the IP address of your ISP's Primary DNS Server. If a Secondary DNS Server address is available, enter it.

**Note:** A DNS server is a host on the Internet that translates Internet names (such as www.netgear.com) to numeric IP addresses. Typically your ISP transfers the IP address of one or two DNS servers to your firewall during login. If the ISP does not transfer an address, you must obtain it from the ISP and enter it manually here. If you enter an address here, you should reboot your PCs after configuring the firewall.

6. Router's MAC Address: This section determines the Ethernet MAC address that will be used by the firewall on the Internet port. Some ISPs will register the Ethernet MAC address of the network interface card in your PC when your account is first opened. They will then only accept traffic from the MAC address of that PC. This feature allows your firewall to masquerade as that PC by "cloning" its MAC address. To change the MAC address, select "Use this Computer's MAC address." The firewall will then capture and use the MAC address of the PC that you are now using. You must be using the one PC that is allowed by the ISP. Or, select "Use this MAC address" and enter it.
7. Click **Apply** to save your settings.
8. Click **Test** to test your Internet connection. If the NETGEAR website does not appear within one minute, refer to [Chapter 8, Troubleshooting](#).



# Chapter 4

## Serial Port Configuration

This chapter describes how to configure the serial port options of your FR328S ProSafe Firewall with Dial Back-Up. The FR328S serial port lets you share the broadband connection of another FR328S, share resources between two LANs, and take advantage of the routing functions on the broadband (WAN), LAN, and serial network interfaces.

**Note:** If you configure the serial port of the FR328S as the primary Internet connection, you will not be able to configure the other serial port options. For instructions on configuring the serial port as the primary Internet connection, please see [“Configuring a Serial Port as the Primary Internet Connection“](#) on page 3-13.

The FR328S provides these serial port configuration options:

- **Modem**  
Use this option to configure the serial modem settings for any of the features below.
- **Auto-Rollover**  
Use this option to provide a backup connection for your broadband service. If the broadband service you configured in the Basic Settings menu fails, the FR328S will automatically connect to the Internet through the serial port. However, you will then be accessing the Internet at a slower speed than you would through your broadband service.
- **Dial-in**  
Dial-in lets a single remote computer connect to the FR328S through the serial port to gain access to LAN resources or a remote access server.
- **LAN-to-LAN**  
LAN-to-LAN enables direct communications between two FR328S firewalls to:
  - Share resources on the two LANs.
  - Let users on one FR328S share the Internet connection of the other FR328S.
  - Let users on one FR328S connect to the Internet through the second FR328S in case the broadband connection of the first FR328S fails.

The procedures for these configuration options are presented below.

## Configuring a Serial Port Modem

---

You can configure a serial port modem for any of the features described above.

Be sure you have prepared the basic requirements listed below, then follow the ‘how to’ procedure.

### Basic Requirements for Serial Port Modem Configuration

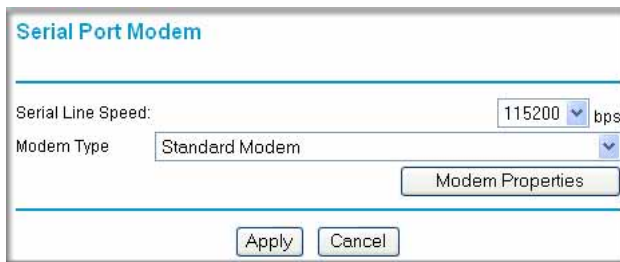
Configuring a serial port modem requires these elements:

1. A serial analog or ISDN modem.
2. A serial modem cable with a DB9 connector.
3. An active phone or ISDN line.

### How to Configure a Serial Port Modem

Follow the steps below to configure a serial port modem.

1. From the main menu, click **Modem** in the Serial Port section.



**Figure 4-1: Serial Port Modem configuration menu**

2. Select the Serial Line Speed.

This is the maximum speed the modem will attempt to use. For ISDN permanent connections, the speeds are typically 64000 or 128000 bps. For dial-up modems, 56000 bps would be a typical setting.

- For ISDN, select “Permanent connection (leased line).”
- For dial-up, “Standard Modem” should work in most cases. Otherwise, select your modem from the list.



- If your modem is not on the list, select “User Defined” and enter the Modem Properties.

If you are using the “User Defined” selection and configuring your own modem stings, fill in the Modem Properties settings.

**Note:** You can validate modem string settings by first connecting the modem directly to a PC, establishing a connection to your ISP, and then copying the modem string settings from the PC configuration and pasting them into the FR328S Modem Properties Initial String field. For more information on this procedure, please refer to the support area of the NETGEAR web site.

3. Click **Apply** to save your settings.

## Configuring Auto-Rollover

---

You can configure the serial port of the FR328S to provide an auto-rollover backup connection for your broadband service.

Be sure you have prepared the basic requirements listed below, then follow the ‘how to’ procedure.

### Basic Requirements for Auto-Rollover

Auto-Rollover requires these elements:

1. A broadband connection to the FR328S.
2. An ISDN or analog phone line with an active ISDN or dial-up ISP account
3. A serial modem properly configured and attached to the DB9 connector on the serial port.
4. The Auto-Rollover settings configured and applied to the FR328S.

### How to Configure Auto-Rollover

Follow the steps below to configure a serial port auto-rollover connection.

1. Configure a serial port modem according to the instructions above.
2. From the main menu, click **Auto-rollover** in the Serial Port section.

**Auto-Rollover**

---

**Serial Port Internet Access**

Enable Auto-Rollover (Use serial port if Broadband connection fails.)

Broadband failure detection:  Ping ISP DNS  
 Ping public IP 0 . 0 . 0 . 0

Auto-Rollover wait time 1 min

---

**Dial-up Internet Account**

Account/User Name

Password:

Telephone

Alternative Telephone

Connect as required

Disconnect after Idle Time of 5 min

---

**Internet IP Address:**

Get Dynamically From ISP  
 Use Static IP Address 0 . 0 . 0 . 0

**DNS IP Address:**

Get Automatically From ISP  
 Use These DNS Servers

Primary DNS  .  .  .

Secondary DNS  .  .  .

**Figure 4-2: Auto-Rollover configuration menu**

3. Configure the Auto-Rollover settings.
4. Click **Apply** for the changes to take effect.

## Configuring Dial-in on the Serial Port

Dial-in lets a single remote computer connect to the FR328S through the serial port to gain access to LAN resources or a remote access server.

Be sure you have prepared the basic requirements listed below, then follow the ‘how to’ procedure.

## Basic Requirements for Dial-in

Dial-in requires these elements:

1. A broadband connection to the FR328S.
2. An analog phone line.
3. A serial modem properly configured and attached to the DB9 connector on the serial port.
4. The Dial-in settings configured and applied to the FR328S.

## How to Configure Dial-in

Follow the steps below to configure a serial port dial-in connection.

1. Configure a serial port modem according to the instructions above.
2. From the Serial Port section of the main menu, click **Dial-in**.

**Serial Port Dial-in**

**Dial-in Settings**

Enable Dial-in

Dial-in PPP Authentication: PAP

Disconnect after Idle Time of 15 minutes

**Dial-in Users**

#	Name	Enabled	Call Back
1	guest	Disable	Disable

Add Edit Delete

Apply Cancel

**Figure 4-3: Serial Port Dial-in settings screen**

3. Configure the Dial-in settings.
4. Click **Apply** for the changes to take effect.

## Configuring LAN-to-LAN Settings

---

LAN-to-LAN enables direct communications between two FR328S firewalls.

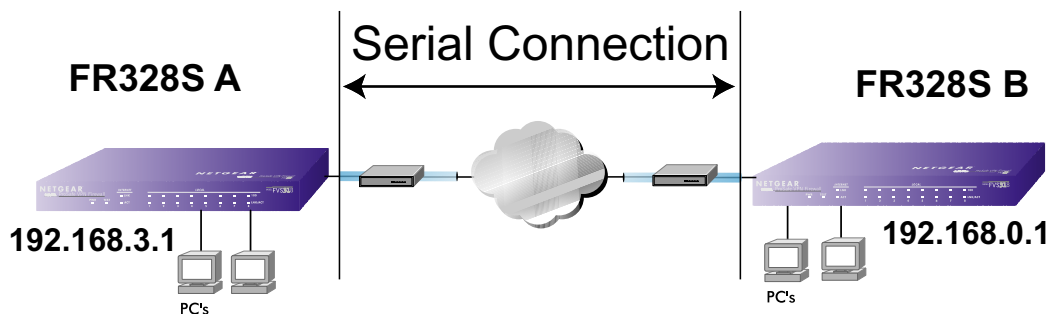


Figure 4-4: LAN-to-LAN network configuration

### Basic Requirements for LAN-to-LAN Connections

Serial port LAN-to-LAN configurations require these elements:

1. An ISDN or analog phone line with an active ISDN or dial-up ISP account.
2. A serial modem properly configured and attached to the DB9 connector on the serial port.
3. A broadband connection to one FR328S for LAN-to-LAN auto-rollover Internet access.
4. The LAN-to-LAN settings configured and applied to the two FR328S firewalls.

### How to Configure LAN-to-LAN Connections

Follow the steps below to configure a serial port LAN-to-LAN connection.

1. Configure a serial port modem according to the instructions above.
2. From the main menu, click **LAN-to-LAN** in the Serial Port section.

The screenshot shows the 'LAN-to-LAN' configuration window. It is divided into three main sections: 'Enable Serial Port LAN-to-LAN function', 'Incoming Connection', and 'Outgoing Connection'. At the bottom are 'Apply' and 'Cancel' buttons.

**LAN-to-LAN**

Enable Serial Port LAN-to-LAN function

Remote Gateway LAN IP address: 0 0 0 0

Network Mask: 0 0 0 0

Disconnect after Idle Time of 0 minutes

Use LAN-to-LAN connection for Internet access if Internet Port fails.

**Incoming Connection**

Enable Incoming connection

Login Name: [text box]

Login Password: [text box]

Authentication: NONE [dropdown arrow]

**Outgoing Connection**

Enable Outgoing connection

Telephone: [text box]

Login Name: [text box]

Login Password: [text box]

[Apply] [Cancel]

**Figure 4-5: LAN-to-LAN configuration menu**

3. Configure the LAN-to-LAN settings.

**Note:** The LAN subnet address of each FR328S must be different.

4. Click **Apply** for the changes to take effect.



# Chapter 5

## Protecting Your Network

This chapter describes how to use the basic firewall features of the FR328S ProSafe Firewall with Dial Back-Up to protect your network.

### Protecting Access to Your FR328S Firewall

---

For security reasons, the firewall has its own user name and password. Also, after a period of inactivity for a set length of time, the administrator login will automatically disconnect. When prompted, enter `admin` for the firewall User Name and `password` for the firewall password. You can use procedures below to change the firewall password and the amount of time for the administrator's login timeout.

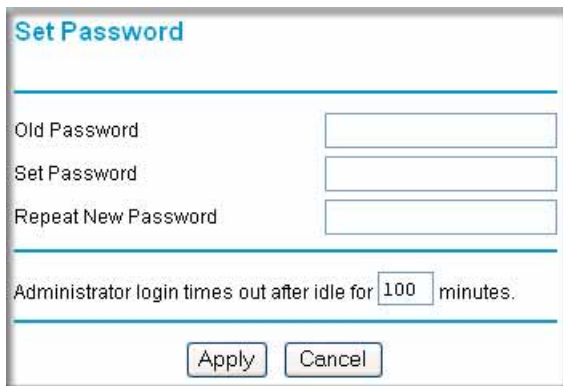
**Note:** The user name and password are not the same as any user name or password you may use to log in to your Internet connection.

Change this password to a more secure password. The ideal password should contain no dictionary words from any language, and should be a mixture of both upper and lower case letters, numbers, and symbols. Your password can be up to 30 characters.

### How to Change the Built-In Password

1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.

2. From the Main Menu of the browser interface, under the Maintenance heading, select Set Password to bring up the menu shown in [Figure 5-1](#).



The screenshot shows a web-based configuration interface titled "Set Password". It contains three text input fields for "Old Password", "Set Password", and "Repeat New Password". Below these is a field for "Administrator login times out after idle for" with a numeric input set to "100" and the text "minutes". At the bottom are "Apply" and "Cancel" buttons.

**Figure 5-1: Set Password menu**

3. To change the password, first enter the old password, and then enter the new password twice.
4. Click **Apply** to save your changes.

**Note:** After changing the password, you will be required to log in again to continue the configuration. If you have backed up the firewall settings previously, you should do a new backup so that the saved settings file includes the new password.

## How to Change the Administrator Login Timeout

For security, the administrator's login to the firewall configuration will timeout after a period of inactivity. To change the login timeout period:

1. In the Set Password menu, type a number in 'Administrator login times out' field. The suggested default value is 5 minutes.
2. Click **Apply** to save your changes or click Cancel to keep the current period.

## Configuring Basic Firewall Services

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Basic firewall services you can configure include access blocking and scheduling of firewall security. These topics are presented below.



## Blocking Keywords, Sites, and Services

The firewall provides a variety of options for blocking Internet based content and communications services. With its content filtering feature, the FR328S Firewall prevents objectionable content from reaching your PCs. The FR328S allows you to control access to Internet content by screening for keywords within Web addresses. Key content filtering options include:

- Blocks access from your LAN to Internet locations that you specify as off-limits.
- Keyword blocking of newsgroup names.
- Outbound Services Blocking limits access from your LAN to Internet locations or services that you specify as off-limits.
- Denial of Service (DoS) protection. Automatically detects and thwarts Denial of Service (DoS) attacks such as Ping of Death, SYN Flood, LAND Attack and IP Spoofing.
- Blocks unwanted traffic from the Internet to your LAN.

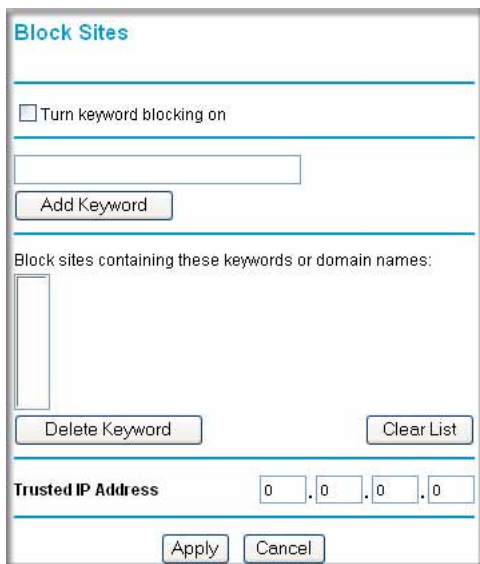
The section below explains how to configure your firewall to perform these functions.

### How to Block Keywords and Sites

The FR328S Firewall allows you to restrict access to Internet content based on functions such as Java or Cookies, Web addresses and Web address keywords.

1. Log in to the firewall at its default LAN address of <http://192.168.0.1> with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.

- Click on the Block Sites link of the Security menu.



The screenshot shows the 'Block Sites' configuration window. At the top, there is a title bar 'Block Sites'. Below it is a checkbox labeled 'Turn keyword blocking on'. Underneath is a text input field for a keyword, followed by an 'Add Keyword' button. A section titled 'Block sites containing these keywords or domain names:' contains a list box. Below the list box are 'Delete Keyword' and 'Clear List' buttons. At the bottom, there is a 'Trusted IP Address' field with four input boxes for each octet, and 'Apply' and 'Cancel' buttons.

**Figure 5-2: Block Sites menu**

- To enable keyword blocking, check “Turn keyword blocking on”, enter a keyword or domain in the Keyword box, click Add Keyword, then click **Apply**.

Some examples of Keyword application follow:

- If the keyword “XXX” is specified, the URL <http://www.badstuff.com/xxx.html> is blocked, as is the newsgroup alt.pictures.xxx.
- If the keyword “.com” is specified, only websites with other domain suffixes (such as .edu or .gov) can be viewed.
- Enter the keyword “.” to block all Internet browsing access.

Up to 32 entries are supported in the Keyword list.

- To delete a keyword or domain, select it from the list, click Delete Keyword, then click **Apply**.
- To specify a Trusted User, enter that PC’s IP address in the Trusted User box and click **Apply**.

You may specify one Trusted User, which is a PC that will be exempt from blocking and logging. Since the Trusted User will be identified by an IP address, you should configure that PC with a fixed IP address.

- Click **Apply** to save your settings.

## Services

Services are functions performed by server computers at the request of client computers. For example, Web servers serve web pages, time servers serve time and date information, and game hosts serve data about other players' moves. When a computer on the Internet sends a request for service to a server computer, the requested service is identified by a service or port number. This number appears as the destination port number in the transmitted IP packets. For example, a packet that is sent with destination port number 80 is an HTTP (Web server) request.

The service numbers for many common protocols are defined by the Internet Engineering Task Force (IETF) and published in RFC1700, "Assigned Numbers." Service numbers for other applications are typically chosen from the range 1024 to 65535 by the authors of the application.

Although the FR328S already holds a list of many service port numbers, you are not limited to these choices. Use the procedure below to create your own service definitions.

### How to Define Services

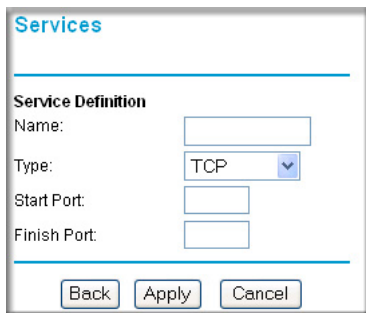
1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.
2. Click **Services** on the Security menu to display the Services menu:



**Figure 5-3: Services menu**

- To create a new Service, click the Add button.
- To edit an existing Service, select its button on the left side of the table and click Edit.
- To delete an existing Service, select its button on the left side of the table and click Delete.

3. Modify the menu shown below for defining or editing a service.



The screenshot shows a web-based interface titled "Services". Under the heading "Service Definition", there are four input fields: "Name:" (a text box), "Type:" (a dropdown menu currently showing "TCP"), "Start Port:" (a text box), and "Finish Port:" (a text box). At the bottom of the form are three buttons: "Back", "Apply", and "Cancel".

**Figure 5-4: Add Services menu**

4. Click **Apply** to save your changes.

## Rules

---

Firewall rules are used to block or allow specific traffic passing through from one side to the other. Inbound rules (WAN to LAN) restrict access by outsiders to private resources, selectively allowing only specific outside users to access specific resources. Outbound rules (LAN to WAN) determine what outside resources local users can have access to.

A firewall has two default rules, one for inbound traffic and one for outbound. The default rules of the FR328S are:

- Inbound: Block all access from outside except responses to requests from the LAN side.
- Outbound: Allow all access from the LAN side to the outside.

You may define additional rules that will specify exceptions to the default rules. By adding custom rules, you can block or allow access based on the service or application, source or destination IP addresses, and time of day. You can also choose to log traffic that matches or does not match the rule you have defined.

To access the Rules configuration of the FR328S, click the Rules link on the main menu, then click Add for either an Outbound or Inbound Service.

The screenshot shows the 'Rules' configuration window. It is divided into two sections: 'Outbound Services' and 'Inbound Services'. Each section contains a table with columns for rule configuration and management buttons.

**Outbound Services Table:**

#	Enable	Service Name	Action	LAN Users	WAN Servers	Log
Default	Yes	Any	ALLOW always	Any	Any	Never

Buttons: Add, Edit, Move, Delete

**Inbound Services Table:**

#	Enable	Service Name	Action	LAN Server IP address	WAN Users	Log
DMZ	Yes	Any	ALLOW always	88.52.83.55	Any	Never
Default	Yes	Any	BLOCK always	--	Any	Match

Buttons: Add, Edit, Move, Delete

Buttons: Apply, Cancel

**Figure 5-5. Rules menu**

- To edit an existing rule, select its button on the left side of the table and click **Edit**.
- To delete an existing rule, select its button on the left side of the table and click **Delete**.
- To move an existing rule to a different position in the table, select its button on the left side of the table and click Move. At the script prompt, enter the number of the desired new position and click **OK**.

## Inbound Rules (Port Forwarding)

When Network Address Translation (NAT) is on, the FR328S presents only one IP address to the Internet, and outside users cannot directly address any of your local computers. However, by defining an inbound rule you can make a local server (for example, a web server or game server) visible and available to the Internet. The rule tells the firewall to direct inbound traffic for a particular service to one local server based on the destination port number. This is also known as port forwarding.

When NAT is off, all Internet addresses on your LAN are presented to the Internet and outside users can directly address any of your local computers. For security purposes, do not turn NAT off unless the FR328S is behind another router or firewall.



**Note:** Some residential broadband ISP accounts do not allow you to run any server processes (such as a Web or FTP server) from your location. Your ISP may periodically check for servers and may suspend your account if it discovers any active services at your location. If you are unsure, refer to the Acceptable Use Policy of your ISP.

Remember that allowing inbound services opens holes in your firewall. Only enable those ports that are necessary for your network. Following are two application examples of inbound rules:

### Inbound Rule Example: A Local Public Web Server

If you host a public web server on your local network, you can define a rule to allow inbound web (HTTP) requests from any outside IP address to the IP address of your web server at any time of day. This rule is shown in [Figure 5-6](#):

The screenshot shows the 'Inbound Services' configuration window. The 'Service' dropdown is set to 'HTTP(TCP:80)'. The 'Action' dropdown is set to 'ALLOW always'. The 'Send to LAN Server' field contains the IP address '192.168.0.99'. The 'WAN Users' dropdown is set to 'Any'. Below this, there are 'start' and 'finish' time fields, both set to '0.0.0.0'. The 'Log' dropdown is set to 'Never'. At the bottom of the window, there are three buttons: 'Back', 'Apply', and 'Cancel'.

**Figure 5-6.** Rule example: A Local Public Web Server

The parameters are:

- **Service**  
From this list, select the application or service to be allowed or blocked. The list already displays many common services, but you are not limited to these choices. Use the Add Services menu to add any additional services or applications that do not already appear.
- **Action**  
Choose how you would like this type of traffic to be handled. You can block or allow always, or you can choose to block or allow according to the schedule you have defined in the Schedule menu.
- **Send to LAN Server**  
Enter the IP address of the PC or Server on your LAN which will receive the inbound traffic covered by this rule.
- **WAN Users**  
These settings determine which packets are covered by the rule, based on their source (WAN) IP address. Select the desired option:
  - Any All IP addresses are covered by this rule.
  - Address range If this option is selected, you must enter the "Start" and "Finish" fields.
  - Single address Enter the required address in the "Start" fields.
- **Log**  
You can select whether the traffic will be logged. The choices are:
  - Never - no log entries will be made for this service.
  - Always - any traffic for this service type will be logged.
  - Match - traffic of this type which matches the parameters and action will be logged.
  - Not match - traffic of this type which does not match the parameters and action will be logged.

## Inbound Rule Example: Allowing Videoconference from Restricted Addresses

If you want to allow incoming videoconferencing to be initiated from a restricted range of outside IP addresses, such as from a branch office, you can create an inbound rule. In the example shown in [Figure 5-7](#), CU-SeeMe connections are allowed only from a specified range of external IP addresses. In this case, we have also specified logging of any incoming CU-SeeMe requests that do not match the allowed parameters.

The screenshot shows the 'Inbound Services' configuration window. The 'Service' dropdown is set to 'CU-SEEME(TCP/UDP:7648)'. The 'Action' dropdown is set to 'ALLOW always'. The 'Send to LAN Server' field contains the IP address '192.168.0.11'. The 'WAN Users' dropdown is set to 'Address Range'. Below it, the 'start' IP is '134.177.88.1' and the 'finish' IP is '134.177.88.254'. The 'Log' dropdown is set to 'Not Match'. At the bottom, there are three buttons: 'Back', 'Apply', and 'Cancel'.

**Figure 5-7. Rule example: Videoconference from Restricted Addresses**

### Considerations for Inbound Rules

- If your external IP address is assigned dynamically by your ISP, the IP address may change periodically as the DHCP lease expires. Consider using the Dynamic DNS feature in the Advanced menus so that external users can always find your network.
- If the IP address of the local server PC is assigned by DHCP, it may change when the PC is rebooted. To avoid this, use the Reserved IP address feature in the LAN IP menu to keep the PC's IP address constant.
- Local PCs must access the local server using the PCs' local LAN address (192.168.0.11 in the example in [Figure 5-7](#) above). Attempts by local PCs to access the server using the external WAN IP address will fail.



## Outbound Rules (Service Blocking)

The FR328S allows you to block the use of certain Internet services by PCs on your network. This is called service blocking or port filtering. You can define an outbound rule to block Internet access from a local PC based on the:

- IP address of the local PC (source address)
- IP address of the Internet site being contacted (destination address)
- Time of day
- Type of service being requested (service port number)

Following is an application example of outbound rules:

### Outbound Rule Example: Blocking Instant Messenger

If you want to block Instant Messenger usage by employees during working hours, you can create an outbound rule to block that application from any internal IP address to any external address according to the schedule that you have created in the Schedule menu. You can also have the firewall log any attempt to use Instant Messenger during that blocked period.

The screenshot shows the 'Outbound Services' configuration window. The 'Service' dropdown is set to 'AIM(TCP:5190)'. The 'Action' dropdown is set to 'BLOCK by schedule, otherwise allow'. Under 'LAN users', the dropdown is set to 'Any', and the 'start' and 'finish' fields are empty. Similarly, under 'WAN Users', the dropdown is set to 'Any' and the 'start' and 'finish' fields are empty. The 'Log' dropdown is set to 'Match'. At the bottom, there are three buttons: 'Back', 'Apply', and 'Cancel'.

**Figure 5-8.** Rule example: Blocking Instant Messenger

The parameters are:

- **Service**  
From this list, select the application or service to be allowed or blocked. The list already displays many common services, but you are not limited to these choices. Use the Add Services menu to add any additional services or applications that do not already appear.
- **Action**  
Choose how you would like this type of traffic to be handled. You can block or allow always, or you can choose to block or allow according to the schedule you have defined in the Schedule menu.
- **LAN Users**  
These settings determine which packets are covered by the rule, based on their source LAN IP address. Select the desired option:
  - **Any** All IP addresses are covered by this rule.
  - **Address range** If this option is selected, you must enter the "Start" and "Finish" fields.
  - **Single address** Enter the required address in the "Start" fields.
- **WAN Users**  
These settings determine which packets are covered by the rule, based on their destination WAN IP address. Select the desired option:
  - **Any** All IP addresses are covered by this rule.
  - **Address range** If this option is selected, you must enter the "Start" and "Finish" fields.
  - **Single address** Enter the required address in the "Start" fields.
- **Log**  
You can select whether the traffic will be logged. The choices are:
  - **Never** - no log entries will be made for this service.
  - **Always** - any traffic for this service type will be logged.
  - **Match** - traffic of this type which matches the parameters and action will be logged.
  - **Not match** - traffic of this type which does not match the parameters and action will be logged.

## Order of Precedence for Rules

As you define new rules, they are added to the tables in the Rules menu, as shown in [Figure 5-9](#):

The screenshot shows the 'Rules' configuration window. It contains two tables: 'Outbound Services' and 'Inbound Services'. Below each table are 'Add', 'Edit', 'Move', and 'Delete' buttons. At the bottom of the window are checkboxes for 'Default DMZ Server' and 'Respond to Ping on Internet WAN Port', followed by an IP address input field and 'Apply' and 'Cancel' buttons.

Outbound Services							
	#	Enable	Service Name	Action	LAN Users	WAN Servers	Log
	1	<input checked="" type="checkbox"/>	AIM	BLOCK by schedule	Any	Any	Match
	Default	Yes	Any	ALLOW always	Any	Any	Never

Inbound Services							
	#	Enable	Service Name	Action	LAN Server IP address	WAN Users	Log
	1	<input checked="" type="checkbox"/>	CU-SEEME	ALLOW always	192.168.0.11	124.177.00.1 - 124.177.00.254	Not Match
	2	<input checked="" type="checkbox"/>	HTTP	ALLOW always	192.168.0.99	Any	Never
	Default	Yes	Any	BLOCK always	-	Any	Match

Default DMZ Server      192 . 168 . 0 . 0  
 Respond to Ping on Internet WAN Port

**Figure 5-9.** Rules table with examples

For any traffic attempting to pass through the firewall, the packet information is subjected to the rules in the order shown in the Rules Table, beginning at the top and proceeding to the default rules at the bottom. In some cases, the order of precedence of two or more rules may be important in determining the disposition of a packet. The Move button allows you to relocate a defined rule to a new position in the table.

## Setting Times and Scheduling Firewall Services

The FR328S Firewall uses the Network Time Protocol (NTP) to obtain the current time and date from one of several Network Time Servers on the Internet. In order to localize the time for your log entries, you must select your Time Zone from the list.

## How to Set Your Time Zone

In order to localize the time for your log entries, you must specify your Time Zone:

1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.
2. Click **Schedule** on the Security menu to display menu shown below.

The screenshot shows the 'Schedule' configuration window. At the top, there is a checkbox labeled 'Use this schedule for rules'. Below this, under the 'Days:' section, are checkboxes for 'Every Day', 'Sunday', 'Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', and 'Saturday'. The 'Time of day:' section includes an 'All Day' checkbox and two rows of time selection: 'Start Time' and 'End Time', each with 'hour' and 'minute' spinners. The 'Time Zone' section features a dropdown menu currently set to '(GMT-08:00) Pacific Time (US Canada)', a checked 'Adjust for daylight savings time' checkbox, and an unchecked 'Use this NTP Server' checkbox with four spinners for IP address. At the bottom, the 'Current time' is displayed as 'Tues, 2003-08-26 13:04:12', and there are 'Apply' and 'Cancel' buttons.

**Figure 5-10: Schedule Services menu**

3. Select your Time Zone. This setting will be used for the blocking schedule according to your local time zone and for time-stamping log entries.

Check the Daylight Savings Time box if your time zone is currently in daylight savings time.

**Note:** If your region uses Daylight Savings Time, you must manually check Adjust for Daylight Savings Time on the first day of Daylight Savings Time, and uncheck it at the end. Enabling Daylight Savings Time will cause one hour to be added to the standard time.

4. The firewall uses Netgear NTP servers by default. If you would prefer to use a particular NTP server as the primary server, enter its IP address under Use this NTP Server.
5. Click **Apply** to save your settings.

## How to Schedule Firewall Services

If you enabled services blocking in the Block Services menu or Port forwarding in the Ports menu, you can set up a schedule for when blocking occurs or when access isn't restricted.

1. Log in to the firewall at its default LAN address of <http://192.168.0.1> with its default User Name of **admin**, default password of **password**, or using whatever Password and LAN address you have chosen for the firewall.
2. Click **Schedule** on the Security menu to display the [Schedule Services menu](#).
3. To block Internet services based on a schedule, select Every Day or select one or more days. If you want to limit access completely for the selected days, select All Day. Otherwise, to limit access during certain times for the selected days, enter Start Blocking and End Blocking times.

**Note:** Enter the values as 24-hour time. For example, 10:30 am would be 10 hours and 30 minutes and 10:30 pm would be 22 hours and 30 minutes.

4. Click **Apply** to save your changes.



# Chapter 6

## Managing Your Network

This chapter describes how to perform network management tasks with your FR328S ProSafe Firewall with Dial Back-Up.

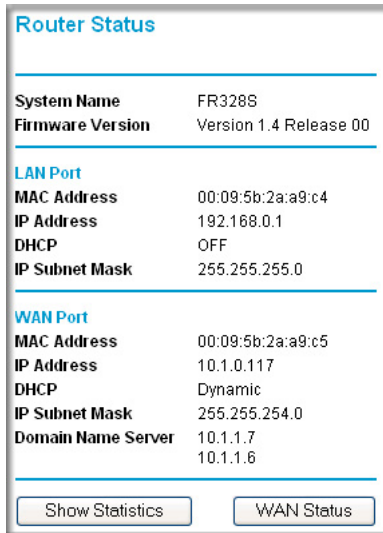
### Network Management Information

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The FR328S provides a variety of status and usage information which is discussed below.

### Viewing Router Status and Usage Statistics

From the Main Menu, under Maintenance, select Router Status to view the screen in [Figure 6-1](#).



Router Status	
System Name	FR328S
Firmware Version	Version 1.4 Release 00
<b>LAN Port</b>	
MAC Address	00:09:5b:2a:a9:c4
IP Address	192.168.0.1
DHCP	OFF
IP Subnet Mask	255.255.255.0
<b>WAN Port</b>	
MAC Address	00:09:5b:2a:a9:c5
IP Address	10.1.0.117
DHCP	Dynamic
IP Subnet Mask	255.255.254.0
Domain Name Server	10.1.1.7 10.1.1.6

Buttons: Show Statistics, WAN Status

**Figure 6-1: Router Status screen**

The Router Status menu provides a limited amount of status and usage information. From the Main Menu of the browser interface, under Maintenance, select Router Status to view the status screen, shown in [Figure 6-1](#).

This screen shows the following parameters:

**Table 6-1. Menu 3.2 - Router Status Fields**

Field	Description
System Name	This field displays the Host Name assigned to the firewall in the Basic Settings menu.
Firmware Version	This field displays the firewall firmware version.
LAN Port	These parameters apply to the Local (WAN) port of the firewall.
MAC Address	This field displays the Ethernet MAC address being used by the Local (LAN) port of the firewall.
IP Address	This field displays the IP address being used by the Local (LAN) port of the firewall. The default is 192.168.0.1
IP Subnet Mask	This field displays the IP Subnet Mask being used by the Local (LAN) port of the firewall. The default is 255.255.255.0
DHCP	If set to OFF, the firewall will not assign IP addresses to local PCs on the LAN. If set to ON, the firewall is configured to assign IP addresses to local PCs on the LAN.
WAN Port	These parameters apply to the Internet (WAN) port of the firewall.
MAC Address	This field displays the Ethernet MAC address being used by the Internet (WAN) port of the firewall.
IP Address	This field displays the IP address being used by the Internet (WAN) port of the firewall. If no address is shown, the firewall cannot connect to the Internet.
DHCP	If set to None, the firewall is configured to use a fixed IP address on the WAN. If set to Client, the firewall is configured to obtain an IP address dynamically from the ISP
IP Subnet Mask	This field displays the IP Subnet Mask being used by the Internet (WAN) port of the firewall.
Domain Name Servers (DNS)	This field displays the DNS Server IP addresses being used by the firewall. These addresses are usually obtained dynamically from the ISP.



Click the “Show Statistics” button to display firewall usage statistics, as shown in [Figure 6-2](#) below:

The screenshot shows a window titled "System Up Time 3:4:35". It contains a table with the following data:

Port	Status	TxPkts	RxPkts	Collisions	Tx B/s	Rx B/s	Up Time
WAN	10/100M	3672	40858	0	14	1637	3:4:35
LAN	10/100M	3902	5063	0	2193	706	3:4:35
Serial	Not Connected	0	0	n/a	0	0	0:0:0

Below the table, there is a "Poll Interval:" label, a text input field containing the number "5", and the text "(secs)". To the right of the input field are two buttons: "Set Interval" and "Stop".

**Figure 6-2. Router Statistics screen**

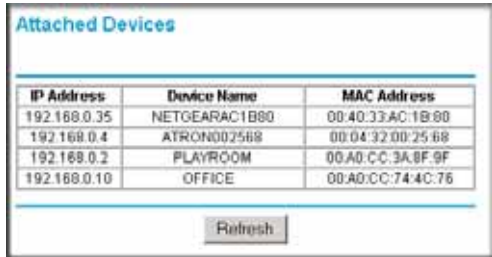
This screen shows the following statistics:

**Table 6-2. Router Statistics Fields**

Field	Description
WAN, LAN, or Serial Port	The statistics for the WAN (Internet), LAN (local), and Serial ports. For each port, the screen displays:
Status	The link status of the port.
TxPkts	The number of packets transmitted on this port since reset or manual clear.
RxPkts	The number of packets received on this port since reset or manual clear.
Collisions	The number of collisions on this port since reset or manual clear.
Tx B/s	The current line utilization—bytes per second of current bandwidth used on this port.
Rx B/s	The bytes per second of average line utilization for this port.
Up Time	The time elapsed since this port acquired link.
System up Time	The time elapsed since the last power cycle or reset.
Poll Interval	Specifies the intervals at which the statistics are updated in this window. Click on Stop to freeze the display.

## Viewing Attached Devices

The Attached Devices menu contains a table of all IP devices that the firewall has discovered on the local network. From the Main Menu of the browser interface, under the Maintenance heading, select Attached Devices to view the table, shown in [Figure 6-3](#).



The screenshot shows a web interface titled "Attached Devices". It contains a table with three columns: "IP Address", "Device Name", and "MAC Address". Below the table is a "Refresh" button.

IP Address	Device Name	MAC Address
192.168.0.35	NETGEARAC1B80	00:40:33:AC:1B:80
192.168.0.4	ATRON002568	00:04:32:00:25:68
192.168.0.2	PLAYROOM	00:A0:C:C:3A:8F:9F
192.168.0.10	OFFICE	00:A0:C:C:74:4C:76

**Figure 6-3: Attached Devices menu**

For each device, the table shows the IP address, NetBIOS Host Name, if available, and the Ethernet MAC address. Note that if the firewall is rebooted, the table data is lost until the firewall rediscovers the devices. To force the firewall to look for attached devices, click the Refresh button.

## Viewing, Selecting, and Saving Logged Information

The firewall will log security-related events such as denied incoming service requests, hacker probes, and administrator logins. If you enabled content filtering in the Block Sites menu, the Logs page shows you when someone on your network tried to access a blocked site. If you enabled e-mail notification, you'll receive these logs in an e-mail message. If you don't have e-mail notification enabled, you can view the logs here. An example is shown below.

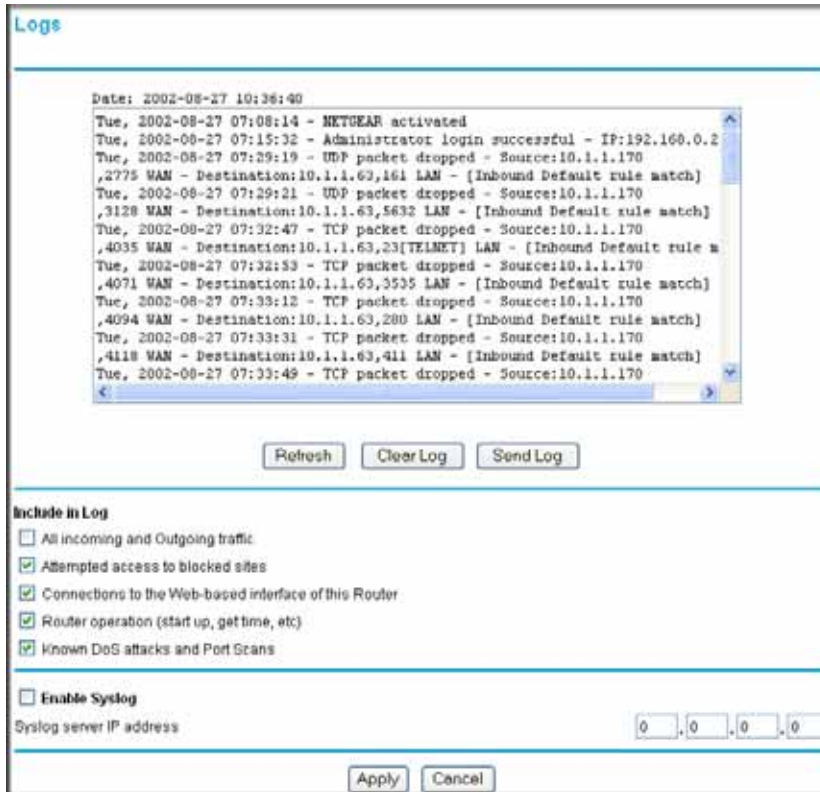


Figure 6-4: Security Logs menu

Log entries are described in [Table 6-5](#)

**Table 6-5: Security Log entry descriptions**

Field	Description
Date and Time	The date and time the log entry was recorded.
Description or Action	The type of event and what action was taken if any.
Source IP	The IP address of the initiating device for this log entry.
Source port and interface	The service port number of the initiating device, and whether it originated from the LAN or WAN
Destination	The name or IP address of the destination device or website.
Destination port and interface	The service port number of the destination device, and whether it's on the LAN or WAN.

Log action buttons are described in [Table 6-6](#)

**Table 6-6: Security Log action buttons**

Field	Description
Refresh	Click this button to refresh the log screen.
Clear Log	Click this button to clear the log entries.
Send Log	Click this button to email the log immediately.
Apply	Click this button to apply the current settings.
Cancel	Click this button to clear the current settings.

## Selecting What Information to Log

Besides the standard information listed above, you can choose to log additional information. Those optional selections are as follows:

- All incoming and outgoing traffic
- Attempted access to blocked site
- Connections to the Web-based interface of this Router

- Router operation (start up, get time, etc.)
- Known DoS attacks and Port Scans

## Saving Log Files on a Server

You can choose to write the logs to a PC running a syslog program. To activate this feature, check the Enable Syslog box and enter the IP address of the server where the log file will be written. Be sure to click Apply to save your changes.

## Examples of log messages

Following are examples of log messages. In all cases, the log entry shows the timestamp as: Day, Year-Month-Date Hour:Minute:Second

### Activation and Administration

Tue, 2002-05-21 18:48:39 - NETGEAR activated

[This entry indicates a power-up or reboot with initial time entry.]

Tue, 2002-05-21 18:55:00 - Administrator login successful - IP:192.168.0.2

Thu, 2002-05-21 18:56:58 - Administrator logout - IP:192.168.0.2

[This entry shows an administrator logging in and out from IP address 192.168.0.2.]

Tue, 2002-05-21 19:00:06 - Login screen timed out - IP:192.168.0.2

[This entry shows a time-out of the administrator login.]

Wed, 2002-05-22 22:00:19 - Log emailed

[This entry shows when the log was emailed.]

### Dropped Packets

Wed, 2002-05-22 07:15:15 - TCP packet dropped - Source:64.12.47.28,4787,WAN - Destination:134.177.0.11,21,LAN - [Inbound Default rule match]

Sun, 2002-05-22 12:50:33 - UDP packet dropped - Source:64.12.47.28,10714,WAN - Destination:134.177.0.11,6970,LAN - [Inbound Default rule match]

Sun, 2002-05-22 21:02:53 - ICMP packet dropped - Source:64.12.47.28,0,WAN - Destination:134.177.0.11,0,LAN - [Inbound Default rule match]

[These entries show an inbound FTP (port 21) packet, UDP packet (port 6970), and ICMP packet (port 0) being dropped as a result of the default inbound rule, which states that all inbound packets are denied.]

## Enabling Security Event E-mail Notification

In order to receive logs and alerts by e-mail, you must provide your e-mail information in the E-Mail subheading:



The screenshot shows a configuration window titled "E-mail". It contains the following elements:

- A checked checkbox labeled "Turn e-mail notification on".
- A section titled "Send alerts and logs by e-mail" with two text input fields: "Outgoing Mail Server" containing "mail.myISP.com" and "E-mail Address" containing "ChrisXY@myISP.com".
- A section titled "Send E-Mail alerts immediately" with three unchecked checkboxes:
  - "If a DoS attack is detected."
  - "If a Port Scan is detected."
  - "If someone attempts to access a blocked site."
- A section titled "Send logs according to this schedule" with a dropdown menu set to "When Log is Full", a "Day" dropdown menu, a "Time" dropdown menu, and radio buttons for "a.m." (selected) and "p.m.".
- "Apply" and "Cancel" buttons at the bottom.

**Figure 6-7: E-mail notification menu**

- Turn e-mail notification on  
Check this box if you wish to receive e-mail logs and alerts from the firewall.
- Your outgoing mail server  
Enter the name or IP address of your ISP's outgoing (SMTP) mail server (such as mail.myISP.com). You may be able to find this information in the configuration menu of your e-mail program. If you leave this box blank, log and alert messages will not be sent via e-mail.

- Send to this e-mail address  
Enter the e-mail address to which logs and alerts are sent. This e-mail address will also be used as the From address. If you leave this box blank, log and alert messages will not be sent via e-mail.

You can specify that logs are automatically sent to the specified e-mail address with these options:

- Send alert immediately  
Check this box if you would like immediate notification of a significant security event, such as a known attack, port scan, or attempted access to a blocked site.
- Send logs according to this schedule  
Specifies how often to send the logs: Hourly, Daily, Weekly, or When Full.
  - Day for sending log  
Specifies which day of the week to send the log. Relevant when the log is sent weekly or daily.
  - Time for sending log  
Specifies the time of day to send the log. Relevant when the log is sent daily or weekly.

If the Weekly, Daily or Hourly option is selected and the log fills up before the specified period, the log is automatically e-mailed to the specified e-mail address. After the log is sent, the log is cleared from the firewall's memory. If the firewall cannot e-mail the log file, the log buffer may fill up. In this case, the firewall overwrites the log and discards its contents.

## Backing Up, Restoring, or Erasing Your Settings

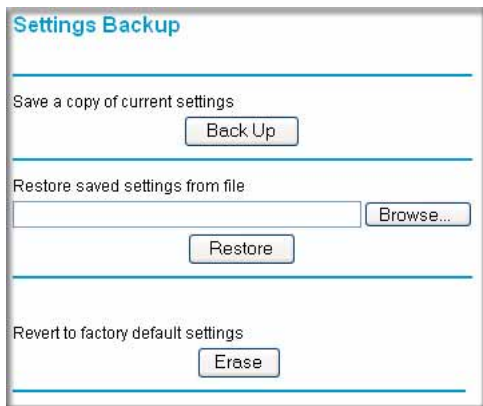
---

The configuration settings of the FR328S Firewall are stored in a configuration file in the firewall. This file can be backed up to your computer, restored, or reverted to factory default settings. The procedures below explain how to do these tasks.

### How to Back Up the Configuration to a File

1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.

- From the Maintenance heading of the Main Menu, select the Settings Backup menu as seen in [Figure 6-8](#).



**Figure 6-8: Settings Backup menu**

- Click **Backup** to save a copy of the current settings.
- Store the `.cfg` file on a computer on your network.

## How to Restore a Configuration from a File

- Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.
- From the Maintenance heading of the Main Menu, select the Settings Backup menu as seen in [Figure 6-8](#).
- Enter the full path to the file on your network or click **Browse** to browse to the file.
- When you have located the `.cfg` file, click **Restore** to upload the file to the firewall.
- The firewall will then reboot automatically.

## How to Erase the Configuration

It is sometimes desirable to restore the firewall to the factory default settings. This can be done by using the Erase function.

- To erase the configuration, from the Maintenance menu Settings Backup link, click **Erase**.



- The firewall will then reboot automatically.

After an erase, the firewall password will be **password**, the LAN IP address will be 192.168.0.1, and the router's DHCP client will be enabled.

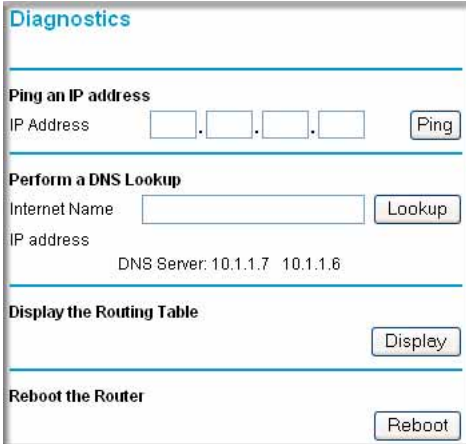
**Note:** To restore the factory default configuration settings without knowing the login password or IP address, you must use the Default Reset button on the rear panel of the firewall. See [“Using the Default Reset button“ on page 8-7](#).

## Running Diagnostic Utilities and Rebooting the Router

The FR328S Firewall has a diagnostics feature. You can use the diagnostics menu to perform the following functions from the firewall:

- Ping an IP Address to test connectivity to see if you can reach a remote host.
- Perform a DNS Lookup to test if an Internet name resolves to an IP address to verify that the DNS server configuration is working.
- Display the Routing Table to identify what other routers the router is communicating with.
- Reboot the Router to enable new network configurations to take effect or to clear problems with the router's network connection.

From the Main Menu of the browser interface, under the Maintenance heading, select the Router Diagnostics heading to display the menu shown in [Figure 6-9](#).



The screenshot shows a web browser interface titled "Diagnostics". It contains four sections, each with a button to execute a function:

- Ping an IP address:** A form with four input boxes for IP address (e.g., . . . .) and a "Ping" button.
- Perform a DNS Lookup:** A form with an "Internet Name" input box and a "Lookup" button. Below the input box, it displays "IP address" and "DNS Server: 10.1.1.7 10.1.1.6".
- Display the Routing Table:** A "Display" button.
- Reboot the Router:** A "Reboot" button.

**Figure 6-9: Diagnostics menu**

## Enabling Remote Management

---

Using the Remote Management page, you can allow a user or users on the Internet to configure, upgrade and check the status of your FR328S ProSafe Firewall with Dial Back-Up.



**Note:** Be sure to change the router's default password to a very secure password. The ideal password should contain no dictionary words from any language, and should be a mixture of letters (both upper and lower case), numbers, and symbols. Your password can be up to 30 characters.

## How to Configure Remote Management

1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever Password and LAN address you have chosen for the firewall.
2. Select the Allow Remote Management check box.
3. Specify what external addresses will be allowed to access the firewall's remote management. For stronger security, restrict access to as few external IP addresses as practical.
  - a. To allow access from any IP address on the Internet, select Everyone.
  - b. To allow access from a range of IP addresses on the Internet, select IP address range. Enter a beginning and ending IP address to define the allowed range.
  - c. To allow access from a single IP address on the Internet, select Only this PC. Enter the IP address that will be allowed access.
4. Specify the Port Number that will be used for accessing the management interface.

Web browser access normally uses the standard HTTPS service port 80. For greater security, you can change the remote management web interface to a custom port by entering that number in the box provided. Choose a number between 1024 and 65535, but do not use the number of any common service port. The default is 8080, which is a common alternate for HTTP.
5. Click **Apply** to have your changes take effect.

When accessing your router from the Internet, you will type your router's WAN IP address into your browser's Address (in IE) or Location (in Netscape) box, followed by a colon (:) and the custom port number. For example, if your external address is 134.177.0.123 and you use port number 8080, enter in your browser:

```
https://134.177.0.123:8080
```

## Upgrading the Router's Firmware

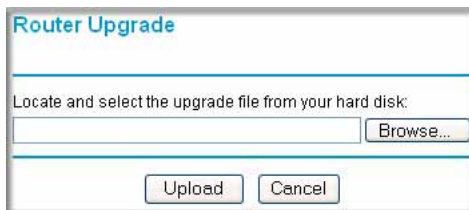
The software of the FR328S Firewall is stored in FLASH memory, and can be upgraded as new software is released by NETGEAR.

Upgrade files can be downloaded from NETGEAR's website. If the upgrade file is compressed (.ZIP file), you must first extract the binary (.IMG) file before uploading it to the firewall.

**Note:** The Web browser used to upload new firmware into the firewall must support HTTP uploads. NETGEAR recommends using Microsoft Internet Explorer 5.0 or Netscape Navigator 4.7 and above.

## How to Upgrade the Router

1. Download and unzip the new software file from the NETGEAR web site.
2. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.
3. From the Main Menu of the browser interface, under the Maintenance heading, select the Router Upgrade heading to display the menu shown in [Figure 6-10](#).



**Figure 6-10: Router Upgrade menu**

4. In the Router Upgrade menu, click **Browse** to locate the binary (.IMG) upgrade file.

5. Click **Upload**.

**Note:** When uploading software to the firewall, it is important not to interrupt the Web browser by closing the window, clicking a link, or loading a new page. If the browser is interrupted, it may corrupt the software. When the upload is complete, your firewall will automatically restart. The upgrade process will typically take about one minute. In some cases, you may need to clear the configuration and reconfigure the firewall after upgrading.

# Chapter 7

## Advanced Configuration

This chapter describes how to configure the advanced features of your FR328S ProSafe Firewall with Dial Back-Up.

### Configuring Advanced Security

---

The FR328S ProSafe Firewall with Dial Back-Up provides a variety of advanced features, such as:

- Setting up a Demilitarized Zone (DMZ) Server
- The flexibility of configuring your LAN TCP/IP settings
- Connecting a Remote Access Server through the serial port

These features are discussed below.

### Setting Up A Default DMZ Server

The Default DMZ Server feature is helpful when using some online games and videoconferencing applications that are incompatible with NAT. The firewall is programmed to recognize some of these applications and to work properly with them, but there are other applications that may not function well. In some cases, one local PC can run the application properly if that PC's IP address is entered as the Default DMZ Server.



**Note:** For security, you should avoid using the Default DMZ Server feature. When a computer is designated as the Default DMZ Server, it loses much of the protection of the firewall, and is exposed to many exploits from the Internet. If compromised, the computer can be used to attack your network.

Incoming traffic from the Internet is normally discarded by the firewall unless the traffic is a response to one of your local computers or a service that you have configured in the Ports menu. Instead of discarding this traffic, you can have it forwarded to one computer on your network. This computer is called the Default DMZ Server.

To assign a computer or server to be a Default DMZ server:

1. Click **Default DMZ Server**.
2. Type the IP address for that server.
3. Click **Apply**.

## Respond to Ping on Internet WAN Port

If you want the firewall to respond to a 'ping' from the Internet, click the 'Respond to Ping on Internet WAN Port' check box. This should only be used as a diagnostic tool, since it allows your firewall to be discovered. Don't check this box unless you have a specific reason to do so.

## Configuring LAN IP Settings

---

The LAN IP Setup menu allows configuration of LAN IP services such as DHCP and RIP. These features can be found under the Advanced heading in the Main Menu of the browser interface.

### LAN TCP/IP Setup

The firewall is shipped preconfigured to use private IP addresses on the LAN side, and to act as a DHCP server. The firewall's default LAN IP configuration is:

- LAN IP addresses—192.168.0.1
- Subnet mask—255.255.255.0

These addresses are part of the IETF-designated private address range for use in private networks, and should be suitable in most applications. If your network has a requirement to use a different IP addressing scheme, you can make those changes in this menu.

The LAN TCP/IP Setup parameters are:

- IP Address  
This is the LAN IP address of the firewall.
- IP Subnet Mask  
This is the LAN Subnet Mask of the firewall. Combined with the IP address, the IP Subnet Mask allows a device to know which other addresses are local to it, and which must be reached through a gateway or router.

- **RIP Direction**

RIP (Router Information Protocol) allows a router to exchange routing information with other routers. The RIP Direction selection controls how the firewall sends and receives RIP packets. Both is the default.

  - When set to Both or Out Only, the firewall will broadcast its routing table periodically.
  - When set to Both or In Only, it will incorporate the RIP information that it receives.
  - When set to None, it will not send any RIP packets and will ignore any RIP packets received.
- **RIP Version**

This controls the format and the broadcasting method of the RIP packets that the router sends. It recognizes both formats when receiving. By default, this is set for RIP-1.

  - RIP-1 is universally supported. RIP-1 is probably adequate for most networks, unless you have an unusual network setup.
  - RIP-2 carries more information. Both RIP-2B and RIP-2M send the routing data in RIP-2 format.
    - RIP-2B uses subnet broadcasting.
    - RIP-2M uses multicasting.



**Note:** If you change the LAN IP address of the firewall while connected through the browser, you will be disconnected. You must then open a new connection to the new IP address and log in again.

## MTU Size

The normal MTU (Maximum Transmit Unit) value for most Ethernet networks is 1500 Bytes. For some ISPs, particularly some using PPPoE, you may need to reduce the MTU. This is rarely required, and should not be done unless you are sure it is necessary for your ISP connection.

Any packets sent through the firewall that are larger than the configured MTU size will be repackaged into smaller packets to meet the MTU requirement. To change the MTU size:

1. Under MTU Size, select Custom.
2. Enter a new size between 64 and 1500.
3. Click **Apply** to save the new configuration.

## DHCP

By default, the firewall will function as a DHCP (Dynamic Host Configuration Protocol) server, allowing it to assign IP, DNS server, and default gateway addresses to all computers connected to the router's LAN. The assigned default gateway address is the LAN address of the firewall. IP addresses will be assigned to the attached PCs from a pool of addresses specified in this menu. Each pool address is tested before it is assigned to avoid duplicate addresses on the LAN.

For most applications, the default DHCP and TCP/IP settings of the firewall are satisfactory. See [“IP Configuration by DHCP” on page B-10](#) for an explanation of DHCP and information about how to assign IP addresses for your network.

### Use router as DHCP server

If another device on your network will be the DHCP server, or if you will manually configure the network settings of all of your computers, clear the ‘Use router as DHCP server’ check box. Otherwise, leave it checked.

Specify the pool of IP addresses to be assigned by setting the Starting IP Address and Ending IP Address. These addresses should be part of the same IP address subnet as the firewall’s LAN IP address. Using the default addressing scheme, you should define a range between 192.168.0.2 and 192.168.0.253, although you may wish to save part of the range for devices with fixed addresses.

The firewall will deliver the following parameters to any LAN device that requests DHCP:

- An IP Address from the range you have defined
- Subnet Mask
- Gateway IP Address is the firewall’s LAN IP address
- Primary DNS Server, if you entered a Primary DNS address in the Basic Settings menu; otherwise, the firewall’s LAN IP address
- Secondary DNS Server, if you entered a Secondary DNS address in the Basic Settings menu
- WINS Server, short for *Windows Internet Naming Service Server*, determines the IP address associated with a particular Windows computer. A WINS server records and reports a list of names and IP address of Windows PCs on its local network. If you connect to a remote network that contains a WINS server, enter the server’s IP address here. This allows your PCs to browse the network using the Network Neighborhood feature of Windows.



## Reserved IP addresses

When you specify a reserved IP address for a PC on the LAN, that PC will always receive the same IP address each time it access the firewall's DHCP server. Reserved IP addresses should be assigned to servers that require permanent IP settings.

To reserve an IP address:

1. Click **Add**.
2. In the IP Address box, type the IP address to assign to the PC or server.  
Choose an IP address from the router's LAN subnet, such as 192.168.0.X.
3. Type the MAC Address of the PC or server.  
**Tip:** If the PC is already present on your network, you can copy its MAC address from the Attached Devices menu and paste it here.

4. Click **Apply** to enter the reserved address into the table.

**Note:** The reserved address will not be assigned until the next time the PC contacts the router's DHCP server. Reboot the PC or access its IP configuration and force a DHCP release and renew.

To edit or delete a reserved address entry:

1. Click the button next to the reserved address you want to edit or delete.
2. Click Edit or Delete.

## How to Configure LAN TCP/IP Setup

1. Log in to the firewall at its default LAN address of <http://192.168.0.1> with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.

- From the Main Menu, under Advanced, click the LAN IP Setup link to view the menu, shown in [Figure 7-1](#)

The screenshot shows the 'LAN IP Setup' configuration window. It includes the following fields and controls:

- LAN TCP/IP Setup:**
  - IP Address: 192, 168, 0, 1
  - IP Subnet Mask: 255, 255, 255, 0
  - RIP Direction: None (dropdown)
  - RIP Version: Disabled (dropdown)
- DHCP server settings:**
  - Use router as DHCP server
  - Starting IP Address: 0, 0, 0, 0
  - Ending IP Address: 0, 0, 0, 0
- Reserved IP Table:**

#	IP Address	Mac Address	Device Name
<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>			

At the bottom of the window are  and  buttons.

**Figure 7-1: LAN IP Setup Menu**

- Enter the TCP/IP, MTU, or DHCP parameters.
- Click **Apply** to save your changes.

## Configuring Dynamic DNS

If your network has a permanently assigned IP address, you can register a domain name and have that name linked with your IP address by public Domain Name Servers (DNS). However, if your Internet account uses a dynamically assigned IP address, you will not know in advance what your IP address will be, and the address can change frequently. In this case, you can use a commercial dynamic DNS service, who will allow you to register your domain to their IP address, and will forward traffic directed at your domain to your frequently-changing IP address.

The firewall contains a client that can connect to a dynamic DNS service provider. To use this feature, you must select a service provider and obtain an account with them. After you have configured your account information in the firewall, whenever your ISP-assigned IP address changes, your firewall will automatically contact your dynamic DNS service provider, log in to your account, and register your new IP address.

## How to Configure Dynamic DNS

1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever password and LAN address you have chosen for the firewall.
2. From the Main Menu of the browser interface, under Advanced, click **Dynamic DNS**.
3. Access the website of one of the dynamic DNS service providers whose names appear in the ‘Select Service Provider’ box, and register for an account.  
For example, for `dyndns.org`, go to `www.dyndns.org`.
4. Select the “Use a dynamic DNS service” check box.
5. Select the name of your dynamic DNS Service Provider.
6. Type the Host Name that your dynamic DNS service provider gave you.  
The dynamic DNS service provider may call this the domain name. If your URL is `myName.dyndns.org`, then your Host Name is “myName.”
7. Type the User Name for your dynamic DNS account.
8. Type the Password (or key) for your dynamic DNS account.
9. If your dynamic DNS provider allows the use of wildcards in resolving your URL, you may select the Use wildcards check box to activate this feature.  
For example, the wildcard feature will cause `*.yourhost.dyndns.org` to be aliased to the same IP address as `yourhost.dyndns.org`
10. Click **Apply** to save your configuration.
11. You can now check the status of the Dynamic DNS connection by clicking **Show Status**.



**Note:** If your ISP assigns a private WAN IP address such as `192.168.x.x` or `10.x.x.x`, the dynamic DNS service will not work because private addresses will not be routed on the Internet.

## Using Static Routes

---

Static Routes provide additional routing information to your firewall. Under normal circumstances, the firewall has adequate routing information after it has been configured for Internet access, and you do not need to configure additional static routes. You must configure static routes only for unusual cases such as multiple routers or multiple IP subnets located on your network.

### Static Route Example

As an example of when a static route is needed, consider the following case:

- Your primary Internet access is through a cable modem to an ISP.
- You have an ISDN router on your home network for connecting to the company where you are employed. This router's address on your LAN is 192.168.0.100.
- Your company's network is 134.177.0.0.

When you first configured your firewall, two implicit static routes were created. A default route was created with your ISP as the gateway, and a second static route was created to your local network for all 192.168.0.x addresses. With this configuration, if you attempt to access a device on the 134.177.0.0 network, your firewall will forward your request to the ISP. The ISP forwards your request to the company where you are employed, and the request will likely be denied by the company's firewall.

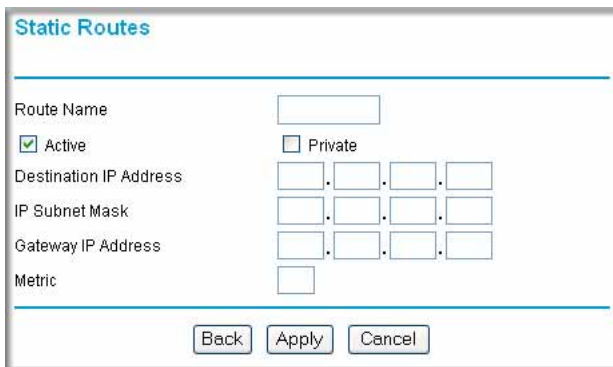
In this case you must define a static route, telling your firewall that 134.177.0.0 should be accessed through the ISDN router at 192.168.0.100. The static route would look like [Figure 7-2](#).

In this example:

- The Destination IP Address and IP Subnet Mask fields specify that this static route applies to all 134.177.x.x addresses.
- The Gateway IP Address fields specifies that all traffic for these addresses should be forwarded to the ISDN router at 192.168.0.100.
- A Metric value of 1 will work since the ISDN router is on the LAN. This represents the number of routers between your network and the destination. This is a direct connection so it is set to 1.
- Private is selected only as a precautionary security measure in case RIP is activated.

## How to Configure Static Routes

1. Log in to the firewall at its default LAN address of `http://192.168.0.1` with its default User Name of **admin**, default password of **password**, or using whatever Password and LAN address you have chosen for the firewall.
2. From the Main Menu of the browser interface, under Advanced, click on Static Routes to view the Static Routes menu.
3. To add or edit a Static Route:
  - a. Click **Edit** to open the Static Routes edit menu.



The screenshot shows a web browser window titled "Static Routes". The interface includes the following fields and controls:

- Route Name:** A text input box.
- Active:** A checked checkbox.
- Private:** An unchecked checkbox.
- Destination IP Address:** Four input boxes separated by dots.
- IP Subnet Mask:** Four input boxes separated by dots.
- Gateway IP Address:** Four input boxes separated by dots.
- Metric:** A single input box.

At the bottom of the form are three buttons: "Back", "Apply", and "Cancel".

**Figure 7-2: Static Route Entry and Edit Menu**

- b. Type a route name for this static route in the Route Name box under the table. This is for identification purpose only.
- c. Select Active to make this route effective.
- d. Select Private if you want to limit access to the LAN only. The static route will not be reported in RIP.
- e. Type the Destination IP Address of the final destination.
- f. Type the IP Subnet Mask for this destination. If the destination is a single host, type `255.255.255.255`.
- g. Type the Gateway IP Address, which must be a router on the same LAN segment as the firewall.

- h. Type a number between 1 and 15 as the Metric value.  
This represents the number of routers between your network and the destination. Usually, a setting of 2 or 3 works, but if this is a direct connection, set it to 1.
4. Click **Apply** to have the static route entered into the table.

# Chapter 8

## Troubleshooting

This chapter gives information about troubleshooting your FR328S ProSafe Firewall with Dial Back-Up. For the common problems listed, go to the section indicated.

- Is the firewall on?
- Have I connected the firewall correctly?  
Go to [“Basic Functions” on page 8-1.](#)
- I can’t access the firewall’s configuration with my browser.  
Go to [“Troubleshooting the Web Configuration Interface” on page 8-3.](#)
- I’ve configured the firewall but I can’t access the Internet.  
Go to [“Troubleshooting the ISP Connection” on page 8-4.](#)
- I can’t remember the firewall’s configuration password.
- I want to clear the configuration and start over again.  
Go to [“Restoring the Default Configuration and Password” on page 8-7.](#)

### Basic Functions

---

After you turn on power to the firewall, the following sequence of events should occur:

1. When power is first applied, verify that the Power LED is on.
2. Verify that the Test LED lights within a few seconds, indicating that the self-test procedure is running.
3. After approximately 10 seconds, verify that:
  - a. The Test LED is not lit.
  - b. The Local port Link LEDs are lit for any local ports that are connected.
  - c. The Internet Link port LED is lit.

If a port's Link LED is lit, a link has been established to the connected device. If a port is connected to a 100 Mbps device, verify that the port's 100 LED is lit.

If any of these conditions does not occur, refer to the appropriate following section.

## Power LED Not On

If the Power and other LEDs are off when your firewall is turned on:

- Make sure that the power cord is properly connected to your firewall and that the power supply adapter is properly connected to a functioning power outlet.
- Check that you are using the 12VDC power adapter supplied by NETGEAR for this product.

If the error persists, you have a hardware problem and should contact technical support.

## Test LED Never Turns On or Test LED Stays On

When the firewall is turned on, the Test LED turns on for about 10 seconds and then turns off. If the Test LED does not turn on, or if it stays on, there is a fault within the firewall.

If you experience problems with the Test LED:

- Cycle the power to see if the firewall recovers and the LED blinks for the correct amount of time.

If all LEDs including the Test LED are still on one minute after power up:

- Cycle the power to see if the firewall recovers.
- Clear the firewall's configuration to factory defaults. This will set the firewall's IP address to 192.168.0.1. This procedure is explained in [“Using the Default Reset button” on page 8-7](#).

If the error persists, you might have a hardware problem and should contact technical support.

## Local or Internet Port Link LEDs Not On

If either the Local or Internet Port Link LEDs do not light when the Ethernet connection is made, check the following:

- Make sure that the Ethernet cable connections are secure at the firewall and at the hub or PC.
- Make sure that power is turned on to the connected hub or PC.



- Be sure you are using the correct cable:
  - When connecting the firewall’s Internet port to a cable or DSL modem, use the cable that was supplied with the cable or DSL modem. This cable could be a standard straight-through Ethernet cable or an Ethernet crossover cable.

## Troubleshooting the Web Configuration Interface

---

If you are unable to access the firewall’s Web Configuration interface from a PC on your local network, check the following:

- Check the Ethernet connection between the PC and the firewall as described in the previous section.
- Make sure your PC’s IP address is on the same subnet as the firewall. If you are using the recommended addressing scheme, your PC’s address should be in the range of 192.168.0.2 to 192.168.0.254. Refer to [“Verifying TCP/IP Properties“ on page C-5](#) or [“Configuring the Macintosh for TCP/IP Networking“ on page C-6](#) to find your PC’s IP address. Follow the instructions in [Appendix C](#) to configure your PC.

**Note:** If your PC’s IP address is shown as 169.254.x.x:

Recent versions of Windows and MacOS will generate and assign an IP address if the computer cannot reach a DHCP server. These auto-generated addresses are in the range of 169.254.x.x. If your IP address is in this range, check the connection from the PC to the firewall and reboot your PC.

- If your firewall’s IP address has been changed and you don’t know the current IP address, clear the firewall’s configuration to factory defaults. This will set the firewall’s IP address to 192.168.0.1. This procedure is explained in [“Using the Default Reset button“ on page 8-7](#).
- Make sure your browser has Java, JavaScript, or ActiveX enabled. If you are using Internet Explorer, click Refresh to be sure the Java applet is loaded.
- Try quitting the browser and launching it again.
- Make sure you are using the correct login information. The factory default login name is **admin** and the password is **password**. Make sure that CAPS LOCK is off when entering this information.

If the firewall does not save changes you have made in the Web Configuration Interface, check the following:

- When entering configuration settings, be sure to click the APPLY button before moving to another menu or tab, or your changes are lost.

- Click the Refresh or Reload button in the Web browser. The changes may have occurred, but the Web browser may be caching the old configuration.

## Troubleshooting the ISP Connection

---

If your firewall is unable to access the Internet, you should first determine whether the firewall is able to obtain a WAN IP address from the ISP. Unless you have been assigned a static IP address, your firewall must request an IP address from the ISP. You can determine whether the request was successful using the Web Configuration Manager.

To check the WAN IP address:

1. Launch your browser and select an external site such as [www.netgear.com](http://www.netgear.com)
2. Access the Main Menu of the firewall's configuration at <http://192.168.0.1>
3. Under the Maintenance heading, select Router Status
4. Check that an IP address is shown for the WAN Port  
If 0.0.0.0 is shown, your firewall has not obtained an IP address from your ISP.

If your firewall is unable to obtain an IP address from the ISP, you may need to force your cable or DSL modem to recognize your new firewall by performing the following procedure:

1. Turn off power to the cable or DSL modem.
2. Turn off power to your firewall.
3. Wait five minutes and reapply power to the cable or DSL modem.
4. When the modem's LEDs indicate that it has reacquired sync with the ISP, reapply power to your firewall.

If your firewall is still unable to obtain an IP address from the ISP, the problem may be one of the following:

- Your ISP may require a login program.  
Ask your ISP whether they require PPP over Ethernet (PPPoE) or some other type of login.
- If your ISP requires a login, you may have incorrectly set the login name and password.
- Your ISP may check for your PC's host name.  
Assign the PC Host Name of your ISP account as the Account Name in the Basic Settings menu.

- Your ISP only allows one Ethernet MAC address to connect to Internet, and may check for your PC's MAC address. In this case:

Inform your ISP that you have bought a new network device, and ask them to use the firewall's MAC address.

OR

Configure your firewall to spoof your PC's MAC address. This can be done in the Basic Settings menu. Refer to [“Manually Configuring Your Internet Connection”](#) on page 3-16.

If your firewall can obtain an IP address, but your PC is unable to load any web pages from the Internet:

- Your PC may not recognize any DNS server addresses.

A DNS server is a host on the Internet that translates Internet names (such as [www.netgear.com](#)) to numeric IP addresses. Typically your ISP will provide the addresses of one or two DNS servers for your use. If you entered a DNS address during the firewall's configuration, reboot your PC and verify the DNS address as described in [“Verifying TCP/IP Properties”](#) on page C-6. Alternatively, you may configure your PC manually with DNS addresses, as explained in your operating system documentation.

- Your PC may not have the firewall configured as its TCP/IP gateway.

If your PC obtains its information from the firewall by DHCP, reboot the PC and verify the gateway address as described in [“Verifying TCP/IP Properties”](#) on page C-6.

## Troubleshooting a TCP/IP Network Using a Ping Utility

---

Most TCP/IP terminal devices and routers contain a ping utility that sends an echo request packet to the designated device. The device then responds with an echo reply. Troubleshooting a TCP/IP network is made easier by using the ping utility in your PC or workstation.

### Testing the LAN Path to Your Firewall

You can ping the firewall from your PC to verify that the LAN path to your firewall is set up correctly.

To ping the firewall from a PC running Windows 95 or later:

1. From the Windows toolbar, click on the Start button and select Run.

2. In the field provided, type Ping followed by the IP address of the firewall, as in this example:

```
ping 192.168.0.1
```

3. Click on OK.

You should see a message like this one:

```
Pinging <IP address> with 32 bytes of data
```

If the path is working, you see this message:

```
Reply from < IP address >: bytes=32 time=NN ms TTL=xxx
```

If the path is not working, you see this message:

```
Request timed out
```

If the path is not functioning correctly, you could have one of the following problems:

- Wrong physical connections
  - Make sure the LAN port LED is on. If the LED is off, follow the instructions in [“Local or Internet Port Link LEDs Not On”](#) on page 8-2.
  - Check that the corresponding Link LEDs are on for your network interface card and for the hub ports (if any) that are connected to your workstation and firewall.
- Wrong network configuration
  - Verify that the Ethernet card driver software and TCP/IP software are both installed and configured on your PC or workstation.
  - Verify that the IP address for your firewall and your workstation are correct and that the addresses are on the same subnet.

## Testing the Path from Your PC to a Remote Device

After verifying that the LAN path works correctly, test the path from your PC to a remote device. From the Windows run menu, type:

```
PING -n 10 <IP address>
```

where *<IP address>* is the IP address of a remote device such as your ISP's DNS server.

If the path is functioning correctly, replies as in the previous section are displayed. If you do not receive replies:

- Check that your PC has the IP address of your firewall listed as the default gateway. If the IP configuration of your PC is assigned by DHCP, this information will not be visible in your PC's Network Control Panel. Verify that the IP address of the firewall is listed as the default gateway as described in [“Verifying TCP/IP Properties”](#) on page C-5.
- Check to see that the network address of your PC (the portion of the IP address specified by the netmask) is different from the network address of the remote device.
- Check that your cable or DSL modem is connected and functioning.
- If your ISP assigned a host name to your PC, enter that host name as the Account Name in the Basic Settings menu.
- Your ISP could be rejecting the Ethernet MAC addresses of all but one of your PCs. Many broadband ISPs restrict access by only allowing traffic from the MAC address of your broadband modem, but some ISPs additionally restrict access to the MAC address of a single PC connected to that modem. If this is the case, you must configure your firewall to “clone” or “spoof” the MAC address from the authorized PC. Refer to [“Manually Configuring Your Internet Connection”](#) on page 3-16.

---

## Restoring the Default Configuration and Password

---

This section explains how to restore the factory default configuration settings, changing the firewall's administration password to **password** and the IP address to 192.168.0.1. You can erase the current configuration and restore factory defaults in two ways:

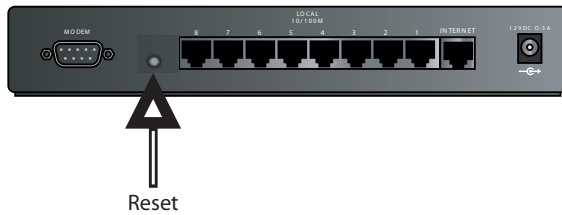
- Use the Erase function of the Web Configuration Manager (see [“Backing Up, Restoring, or Erasing Your Settings”](#) on page 6-9).
- Use the Default Reset button on the rear panel of the firewall. Use this method for cases when the administration password or IP address is not known.

### Using the Default Reset button

To restore the factory default configuration settings without knowing the administration password or IP address, you must use the Default Reset button on the rear panel of the firewall.

To restore the factory default configuration settings, follow these steps:

1. Press and hold the Default Reset button until the Test LED turns on (about 10 seconds).



**Figure 8-1. Reset Button**

2. Release the Default Reset button and wait for the firewall to reboot.

## Problems with Date and Time

---

The E-Mail menu in the Content Filtering section displays the current date and time of day. The FR328S Firewall uses the Network Time Protocol (NTP) to obtain the current time from one of several Network Time Servers on the Internet. Each entry in the log is stamped with the date and time of day. Problems with the date and time function can include:

- Date shown is January 1, 2000  
Cause: The firewall has not yet successfully reached a Network Time Server. Check that your Internet access settings are configured correctly. If you have just completed configuring the firewall, wait at least five minutes and check the date and time again.
- Time is off by one hour  
Cause: The firewall does not automatically sense Daylight Savings Time. In the E-Mail menu, check or uncheck the box marked “Adjust for Daylight Savings Time”.

# Appendix A

## Technical Specifications

This appendix provides technical specifications for the FR328S ProSafe Firewall with Dial Back-Up.

### Network Protocol and Standards Compatibility

Data and Routing Protocols: TCP/IP, RIP-1, RIP-2, DHCP  
PPP over Ethernet (PPPoE)

### Power Adapter

North America: 120V, 60 Hz, input  
United Kingdom, Australia: 240V, 50 Hz, input  
Europe: 230V, 50 Hz, input  
Japan: 100V, 50/60 Hz, input  
All regions (output): 12 V DC @ 1.2A output, 20W maximum

### Physical Specifications

Dimensions: H: 1.56 in (3.96 cm)  
W: 10.0 in (25.4 cm)  
D: 9.0 in (17.8 cm)

Weight: 2.72 lb. (1.23 Kg)

### Environmental Specifications

Operating temperature: 32°-140° F (0° to 40° C)  
Operating humidity: 90% maximum relative humidity, noncondensing

### Electromagnetic Emissions

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Meets requirements of:                   FCC Part 15 Class B  
  VCCI Class B  
  EN 55 022 (CISPR 22), Class B

**Interface Specifications**

Local:                                       10BASE-T or 100BASE-Tx, RJ-45  
Internet:                                   10BASE-T or 100BASE-Tx, RJ-45

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# Appendix B

## Networks, Routing, and Firewall Basics

This chapter provides an overview of IP networks, routing, and networking.

### Related Publications

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As you read this document, you may be directed to various RFC documents for further information. An RFC is a Request For Comment (RFC) published by the Internet Engineering Task Force (IETF), an open organization that defines the architecture and operation of the Internet. The RFC documents outline and define the standard protocols and procedures for the Internet. The documents are listed on the World Wide Web at [www.ietf.org](http://www.ietf.org) and are mirrored and indexed at many other sites worldwide.

### Basic Router Concepts

---

Large amounts of bandwidth can be provided easily and relatively inexpensively in a local area network (LAN). However, providing high bandwidth between a local network and the Internet can be very expensive. Because of this expense, Internet access is usually provided by a slower-speed wide-area network (WAN) link such as a cable or DSL modem. In order to make the best use of the slower WAN link, a mechanism must be in place for selecting and transmitting only the data traffic meant for the Internet. The function of selecting and forwarding this data is performed by a router.

### What is a Router?

A router is a device that forwards traffic between networks based on network layer information in the data and on routing tables maintained by the router. In these routing tables, a router builds up a logical picture of the overall network by gathering and exchanging information with other routers in the network. Using this information, the router chooses the best path for forwarding network traffic.

Routers vary in performance and scale, number of routing protocols supported, and types of physical WAN connection they support. The FR328S ProSafe Firewall with Dial Back-Up is a small office router that routes the IP protocol over a single-user broadband connection.

## Routing Information Protocol

One of the protocols used by a router to build and maintain a picture of the network is the Routing Information Protocol (RIP). Using RIP, routers periodically update one another and check for changes to add to the routing table.

The FR328S Firewall supports both the older RIP-1 and the newer RIP-2 protocols. Among other improvements, RIP-2 supports subnet and multicast protocols. RIP is not required for most home applications.

## IP Addresses and the Internet

---

Because TCP/IP networks are interconnected across the world, every machine on the Internet must have a unique address to make sure that transmitted data reaches the correct destination. Blocks of addresses are assigned to organizations by the Internet Assigned Numbers Authority (IANA). Individual users and small organizations may obtain their addresses either from the IANA or from an Internet service provider (ISP). You can contact IANA at [www.iana.org](http://www.iana.org).

The Internet Protocol (IP) uses a 32-bit address structure. The address is usually written in dot notation (also called dotted-decimal notation), in which each group of eight bits is written in decimal form, separated by decimal points.

For example, the following binary address:

```
11000011 00100010 00001100 00000111
```

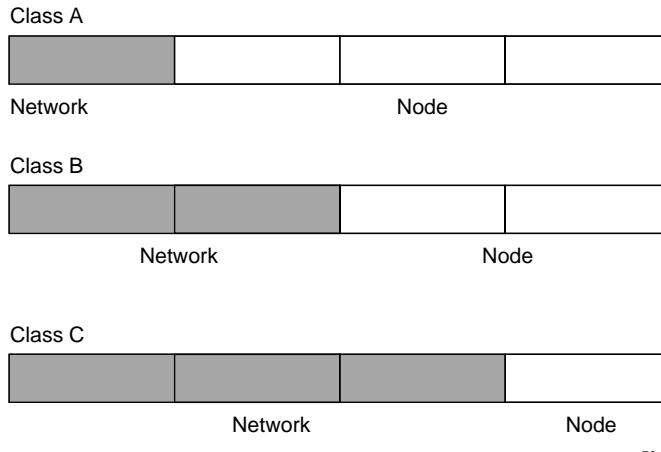
is normally written as:

```
195.34.12.7
```

The latter version is easier to remember and easier to enter into your computer.

In addition, the 32 bits of the address are subdivided into two parts. The first part of the address identifies the network, and the second part identifies the host node or station on the network. The dividing point may vary depending on the address range and the application.

There are five standard classes of IP addresses. These address classes have different ways of determining the network and host sections of the address, allowing for different numbers of hosts on a network. Each address type begins with a unique bit pattern, which is used by the TCP/IP software to identify the address class. After the address class has been determined, the software can correctly identify the host section of the address. The follow figure shows the three main address classes, including network and host sections of the address for each address type.



**Figure 8-2: Three Main Address Classes**

The five address classes are:

- **Class A**  
Class A addresses can have up to 16,777,214 hosts on a single network. They use an eight-bit network number and a 24-bit node number. Class A addresses are in this range:  
1.x.x.x to 126.x.x.x.
- **Class B**  
Class B addresses can have up to 65,354 hosts on a network. A Class B address uses a 16-bit network number and a 16-bit node number. Class B addresses are in this range:  
128.1.x.x to 191.254.x.x.
- **Class C**  
Class C addresses can have 254 hosts on a network. Class C addresses use 24 bits for the network address and eight bits for the node. They are in this range:  
192.0.1.x to 223.255.254.x.

- Class D  
Class D addresses are used for multicasts (messages sent to many hosts). Class D addresses are in this range:  
224.0.0.0 to 239.255.255.255.
- Class E  
Class E addresses are for experimental use.

This addressing structure allows IP addresses to uniquely identify each physical network and each node on each physical network.

For each unique value of the network portion of the address, the base address of the range (host address of all zeros) is known as the network address and is not usually assigned to a host. Also, the top address of the range (host address of all ones) is not assigned, but is used as the broadcast address for simultaneously sending a packet to all hosts with the same network address.

## Netmask

In each of the address classes previously described, the size of the two parts (network address and host address) is implied by the class. This partitioning scheme can also be expressed by a netmask associated with the IP address. A netmask is a 32-bit quantity that, when logically combined (using an AND operator) with an IP address, yields the network address. For instance, the netmasks for Class A, B, and C addresses are 255.0.0.0, 255.255.0.0, and 255.255.255.0, respectively.

For example, the address 192.168.170.237 is a Class C IP address whose network portion is the upper 24 bits. When combined (using an AND operator) with the Class C netmask, as shown here, only the network portion of the address remains:

```
11000000 10101000 10101010 11101101 (192.168.170.237)
```

combined with:

```
11111111 11111111 11111111 00000000 (255.255.255.0)
```

Equals:

```
11000000 10101000 10101010 00000000 (192.168.170.0)
```

As a shorter alternative to dotted-decimal notation, the netmask may also be expressed in terms of the number of ones from the left. This number is appended to the IP address, following a backward slash (/), as “/n.” In the example, the address could be written as 192.168.170.237/24, indicating that the netmask is 24 ones followed by 8 zeros.

## Subnet Addressing

By looking at the addressing structures, you can see that even with a Class C address, there are a large number of hosts per network. Such a structure is an inefficient use of addresses if each end of a routed link requires a different network number. It is unlikely that the smaller office LANs would have that many devices. You can resolve this problem by using a technique known as subnet addressing.

Subnet addressing allows us to split one IP network address into smaller multiple physical networks known as subnetworks. Some of the node numbers are used as a subnet number instead. A Class B address gives us 16 bits of node numbers translating to 64,000 nodes. Most organizations do not use 64,000 nodes, so there are free bits that can be reassigned. Subnet addressing makes use of those bits that are free, as shown below.



**Figure 8-3: Example of Subnetting a Class B Address**

A Class B address can be effectively translated into multiple Class C addresses. For example, the IP address of 172.16.0.0 is assigned, but node addresses are limited to 255 maximum, allowing eight extra bits to use as a subnet address. The IP address of 172.16.97.235 would be interpreted as IP network address 172.16, subnet number 97, and node number 235. In addition to extending the number of addresses available, subnet addressing provides other benefits. Subnet addressing allows a network manager to construct an address scheme for the network by using different subnets for other geographical locations in the network or for other departments in the organization.

Although the preceding example uses the entire third octet for a subnet address, note that you are not restricted to octet boundaries in subnetting. To create more network numbers, you need only shift some bits from the host address to the network address. For instance, to partition a Class C network number (192.68.135.0) into two, you shift one bit from the host address to the network address. The new netmask (or subnet mask) is 255.255.255.128. The first subnet has network number 192.68.135.0 with hosts 192.68.135.1 to 129.68.135.126, and the second subnet has network number 192.68.135.128 with hosts 192.68.135.129 to 192.68.135.254.



**Note:** The number 192.68.135.127 is not assigned because it is the broadcast address of the first subnet. The number 192.68.135.128 is not assigned because it is the network address of the second subnet

The following table lists the additional subnet mask bits in dotted-decimal notation. To use the table, write down the original class netmask and replace the 0 value octets with the dotted-decimal value of the additional subnet bits. For example, to partition your Class C network with subnet mask 255.255.255.0 into 16 subnets (4 bits), the new subnet mask becomes 255.255.255.240.

**Table 8-1. Netmask Notation Translation Table for One Octet**

Number of Bits	Dotted-Decimal Value
1	128
2	192
3	224
4	240
5	248
6	252
7	254
8	255

The following table displays several common netmask values in both the dotted-decimal and the mask length formats.

**Table 8-2. Netmask Formats**

Dotted-Decimal	Masklength
255.0.0.0	/8
255.255.0.0	/16
255.255.255.0	/24
255.255.255.128	/25
255.255.255.192	/26
255.255.255.224	/27
255.255.255.240	/28
255.255.255.248	/29

**Table 8-2. Netmask Formats**

255.255.255.252	/30
255.255.255.254	/31
255.255.255.255	/32

Configure all hosts on a LAN segment to use the same netmask for the following reasons:

- So that hosts recognize local IP broadcast packets

When a device broadcasts to its segment neighbors, it uses a destination address of the local network address with all ones for the host address. In order for this scheme to work, all devices on the segment must agree on which bits comprise the host address.

- So that a local router or bridge recognizes which addresses are local and which are remote

## Private IP Addresses

If your local network is isolated from the Internet (for example, when using NAT), you can assign any IP addresses to the hosts without problems. However, the IANA has reserved the following three blocks of IP addresses specifically for private networks:

10.0.0.0 - 10.255.255.255  
172.16.0.0 - 172.31.255.255  
192.168.0.0 - 192.168.255.255

Choose your private network number from this range. The DHCP server of the FR328S Firewall is preconfigured to automatically assign private addresses.

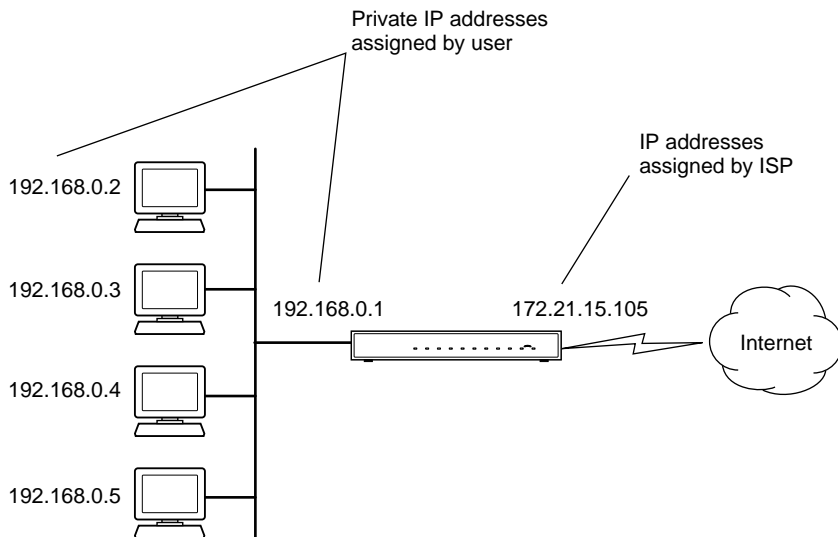
Regardless of your particular situation, do not create an arbitrary IP address; always follow the guidelines explained here. For more information about address assignment, refer to RFC 1597, *Address Allocation for Private Internets*, and RFC 1466, *Guidelines for Management of IP Address Space*. The Internet Engineering Task Force (IETF) publishes RFCs on its Web site at [www.ietf.org](http://www.ietf.org).

## Single IP Address Operation Using NAT

In the past, if multiple PCs on a LAN needed to access the Internet simultaneously, you had to obtain a range of IP addresses from the ISP. This type of Internet account is more costly than a single-address account typically used by a single user with a modem, rather than a router. The FR328S Firewall employs an address-sharing method called Network Address Translation (NAT). This method allows several networked PCs to share an Internet account using only a single IP address, which may be statically or dynamically assigned by your ISP.

The router accomplishes this address sharing by translating the internal LAN IP addresses to a single address that is globally unique on the Internet. The internal LAN IP addresses can be either private addresses or registered addresses. For more information about IP address translation, refer to RFC 1631, *The IP Network Address Translator (NAT)*.

The following figure illustrates a single IP address operation.



**Figure 8-4: Single IP Address Operation Using NAT**



This scheme offers the additional benefit of firewall-like protection because the internal LAN addresses are not available to the Internet through the translated connection. All incoming inquiries are filtered out by the router. This filtering can prevent intruders from probing your system. However, using port forwarding, you can allow one PC (for example, a Web server) on your local network to be accessible to outside users.

## MAC Addresses and Address Resolution Protocol

An IP address alone cannot be used to deliver data from one LAN device to another. To send data between LAN devices, you must convert the IP address of the destination device to its media access control (MAC) address. Each device on an Ethernet network has a unique MAC address, which is a 48-bit number assigned to each device by the manufacturer. The technique that associates the IP address with a MAC address is known as address resolution. Internet Protocol uses the Address Resolution Protocol (ARP) to resolve MAC addresses.

If a device sends data to another station on the network and the destination MAC address is not yet recorded, ARP is used. An ARP request is broadcast onto the network. All stations on the network receive and read the request. The destination IP address for the chosen station is included as part of the message so that only the station with this IP address responds to the ARP request. All other stations discard the request.

## Related Documents

The station with the correct IP address responds with its own MAC address directly to the sending device. The receiving station provides the transmitting station with the required destination MAC address. The IP address data and MAC address data for each station are held in an ARP table. The next time data is sent, the address can be obtained from the address information in the table.

For more information about address assignment, refer to the IETF documents RFC 1597, *Address Allocation for Private Internets*, and RFC 1466, *Guidelines for Management of IP Address Space*.

For more information about IP address translation, refer to RFC 1631, *The IP Network Address Translator (NAT)*.

## Domain Name Server

Many of the resources on the Internet can be addressed by simple descriptive names such as *www.NETGEAR.com*. This addressing is very helpful at the application level, but the descriptive name must be translated to an IP address in order for a user to actually contact the resource. Just as a telephone directory maps names to phone numbers, or as an ARP table maps IP addresses to MAC addresses, a domain name system (DNS) server maps descriptive names of network resources to IP addresses.

When a PC accesses a resource by its descriptive name, it first contacts a DNS server to obtain the IP address of the resource. The PC sends the desired message using the IP address. Many large organizations, such as ISPs, maintain their own DNS servers and allow their customers to use the servers to look up addresses.

## IP Configuration by DHCP

---

When an IP-based local area network is installed, each PC must be configured with an IP address. If the PCs need to access the Internet, they should also be configured with a gateway address and one or more DNS server addresses. As an alternative to manual configuration, there is a method by which each PC on the network can automatically obtain this configuration information. A device on the network may act as a Dynamic Host Configuration Protocol (DHCP) server. The DHCP server stores a list or pool of IP addresses, along with other information (such as gateway and DNS addresses) that it may assign to the other devices on the network. The FR328S Firewall has the capacity to act as a DHCP server.

The FR328S Firewall also functions as a DHCP client when connecting to the ISP. The firewall can automatically obtain an IP address, subnet mask, DNS server addresses, and a gateway address if the ISP provides this information by DHCP.

## Internet Security and Firewalls

---

When your LAN connects to the Internet through a router, an opportunity is created for outsiders to access or disrupt your network. A NAT router provides some protection because by the very nature of the process, the network behind the router is shielded from access by outsiders on the Internet. However, there are methods by which a determined hacker can possibly obtain information about your network or at the least can disrupt your Internet access. A greater degree of protection is provided by a firewall router.

## What is a Firewall?

A firewall is a device that protects one network from another, while allowing communication between the two. A firewall incorporates the functions of the NAT router, while adding features for dealing with a hacker intrusion or attack. Several known types of intrusion or attack can be recognized when they occur. When an incident is detected, the firewall can log details of the attempt, and can optionally send email to an administrator notifying them of the incident. Using information from the log, the administrator can take action with the ISP of the hacker. In some types of intrusions, the firewall can fend off the hacker by discarding all further packets from the hacker's IP address for a period of time.

### Stateful Packet Inspection

Unlike simple Internet sharing routers, a firewall uses a process called stateful packet inspection to ensure secure firewall filtering to protect your network from attacks and intrusions. Since user-level applications such as FTP and Web browsers can create complex patterns of network traffic, it is necessary for the firewall to analyze groups of network connection states. Using Stateful Packet Inspection, an incoming packet is intercepted at the network layer and then analyzed for state-related information associated with all network connections. A central cache within the firewall keeps track of the state information associated with all network connections. All traffic passing through the firewall is analyzed against the state of these connections in order to determine whether or not it will be allowed to pass through or rejected.

### Denial of Service Attack

A hacker may be able to prevent your network from operating or communicating by launching a Denial of Service (DoS) attack. The method used for such an attack can be as simple as merely flooding your site with more requests than it can handle. A more sophisticated attack may attempt to exploit some weakness in the operating system used by your router or gateway. Some operating systems can be disrupted by simply sending a packet with incorrect length information.

## Ethernet Cabling

---

Although Ethernet networks originally used thick or thin coaxial cable, most installations currently use unshielded twisted pair (UTP) cabling. The UTP cable contains eight conductors, arranged in four twisted pairs, and terminated with an RJ45 type connector. A normal straight-through UTP Ethernet cable follows the EIA568B standard wiring as described below in [Table B-1](#)

**Table B-1. UTP Ethernet cable wiring, straight-through**

Pin	Wire color	Signal
1	Orange/White	Transmit (Tx) +
2	Orange	Transmit (Tx) -
3	Green/White	Receive (Rx) +
4	Blue	
5	Blue/White	
6	Green	Receive (Rx) -
7	Brown/White	
8	Brown	

## Category 5 Cable Quality

Category 5 distributed cable that meets ANSI/EIA/TIA-568-A building wiring standards can be a maximum of 328 feet (ft.) or 100 meters (m) in length, divided as follows:

20 ft. (6 m) between the hub and the patch panel (if used)

295 ft. (90 m) from the wiring closet to the wall outlet

10 ft. (3 m) from the wall outlet to the desktop device

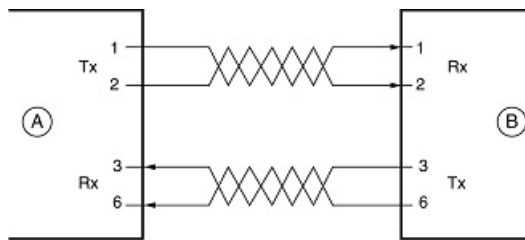
The patch panel and other connecting hardware must meet the requirements for 100 Mbps operation (Category 5). Only 0.5 inch (1.5 cm) of untwist in the wire pair is allowed at any termination point.

A twisted pair Ethernet network operating at 10 Mbits/second (10BASE-T) will often tolerate low quality cables, but at 100 Mbits/second (10BASE-Tx) the cable must be rated as Category 5, or Cat 5, by the Electronic Industry Association (EIA). This rating will be printed on the cable jacket. A Category 5 cable will meet specified requirements regarding loss and crosstalk. In addition, there are restrictions on maximum cable length for both 10 and 100 Mbits/second networks.

## Inside Twisted Pair Cables

For two devices to communicate, the transmitter of each device must be connected to the receiver of the other device. The crossover function is usually implemented internally as part of the circuitry in the device. Computers and workstation adapter cards are usually media-dependent interface ports, called MDI or uplink ports. Most repeaters and switch ports are configured as media-dependent interfaces with built-in crossover ports, called MDI-X or normal ports. Auto Uplink technology automatically senses which connection, MDI or MDI-X, is needed and makes the right connection.

Figure 8-5 illustrates straight-through twisted pair cable.



Key:

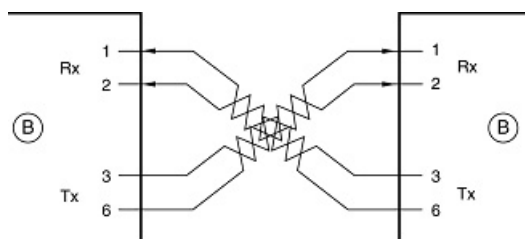
A = UPLINK OR MDI PORT (as on a PC)

B = Normal or MDI-X port (as on a hub or switch)

1, 2, 3, 6 = Pin numbers

**Figure 8-5: Straight-Through Twisted-Pair Cable**

Figure 8-6 illustrates crossover twisted pair cable.

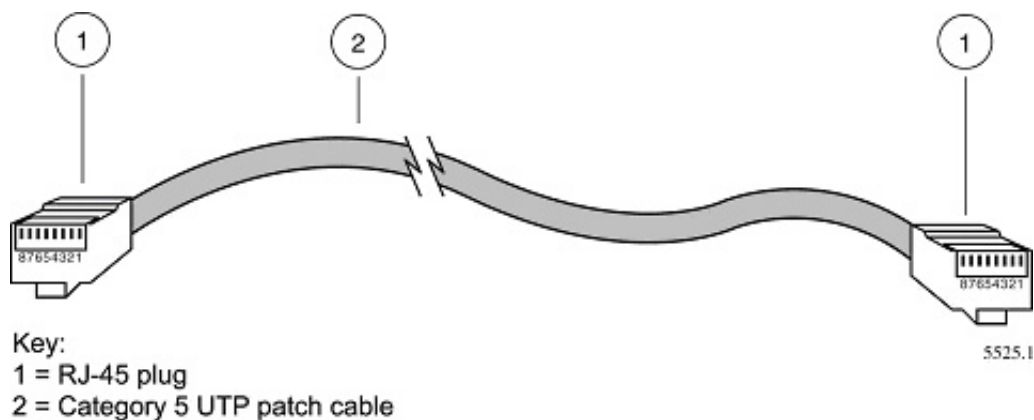


Key:

B = Normal or MDI-X port (as on a hub or switch)

1, 2, 3, 6 = Pin numbers

**Figure 8-6: Crossover Twisted-Pair Cable**



**Figure 8-7: Category 5 UTP Cable with Male RJ-45 Plug at Each End**

**Note:** Flat “silver satin” telephone cable may have the same RJ-45 plug. However, using telephone cable results in excessive collisions, causing the attached port to be partitioned or disconnected from the network.

## Uplink Switches, Crossover Cables, and MDI/MDIX Switching

In the wiring table above, the concept of transmit and receive are from the perspective of the PC, which is wired as Media Dependant Interface (MDI). In this wiring, the PC transmits on pins 1 and 2. At the hub, the perspective is reversed, and the hub receives on pins 1 and 2. This wiring is referred to as Media Dependant Interface - Crossover (MDI-X).

When connecting a PC to a PC, or a hub port to another hub port, the transmit pair must be exchanged with the receive pair. This exchange is done by one of two mechanisms. Most hubs provide an Uplink switch which will exchange the pairs on one port, allowing that port to be connected to another hub using a normal Ethernet cable. The second method is to use a crossover cable, which is a special cable in which the transmit and receive pairs are exchanged at one of the two cable connectors. Crossover cables are often unmarked as such, and must be identified by comparing the two connectors. Since the cable connectors are clear plastic, it is easy to place them side by side and view the order of the wire colors on each. On a straight-through cable, the color order will be the same on both connectors. On a crossover cable, the orange and blue pairs will be exchanged from one connector to the other.

The FR328S Firewall incorporates Auto Uplink™ technology (also called MDI/MDIX). Each LOCAL Ethernet port will automatically sense whether the Ethernet cable plugged into the port should have a normal connection (e.g. connecting to a PC) or an uplink connection (e.g. connecting to a router, switch, or hub). That port will then configure itself to the correct configuration. This feature also eliminates the need to worry about crossover cables, as Auto Uplink™ will accommodate either type of cable to make the right connection.





# Appendix C

## Preparing Your Network

This appendix describes how to prepare your network to connect to the Internet through the FR328S ProSafe Firewall with Dial Back-Up and how to verify the readiness of broadband Internet service from an Internet service provider (ISP).



**Note:** If an ISP technician configured your computer during the installation of a broadband modem, or if you configured it using instructions provided by your ISP, you may need to copy the current configuration information for use in the configuration of your firewall. Write down this information before reconfiguring your computers. Refer to [“Obtaining ISP Configuration Information for Windows Computers”](#) on page C-10 or [“Obtaining ISP Configuration Information for Macintosh Computers”](#) on page C-11 for further information.

### Preparing Your Computers for TCP/IP Networking

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Computers access the Internet using a protocol called TCP/IP (Transmission Control Protocol/Internet Protocol). Each computer on your network must have TCP/IP installed and selected as its networking protocol. If a Network Interface Card (NIC) is already installed in your PC, then TCP/IP is probably already installed as well.

Most operating systems include the software components you need for networking with TCP/IP:

- Windows® 95 or later includes the software components for establishing a TCP/IP network.
- Windows 3.1 does not include a TCP/IP component. You need to purchase a third-party TCP/IP application package such as NetManage Chameleon.
- Macintosh Operating System 7 or later includes the software components for establishing a TCP/IP network.
- All versions of UNIX or Linux include TCP/IP components. Follow the instructions provided with your operating system or networking software to install TCP/IP on your computer.

In your IP network, each PC and the firewall must be assigned a unique IP addresses. Each PC must also have certain other IP configuration information such as a subnet mask (netmask), a domain name server (DNS) address, and a default gateway address. In most cases, you should install TCP/IP so that the PC obtains its specific network configuration information automatically from a DHCP server during bootup. For a detailed explanation of the meaning and purpose of these configuration items, refer to “[Appendix B, “Networks, Routing, and Firewall Basics.”](#)”

The FR328S Firewall is shipped preconfigured as a DHCP server. The firewall assigns the following TCP/IP configuration information automatically when the PCs are rebooted:

- PC or workstation IP addresses—192.168.0.2 through 192.168.0.254
- Subnet mask—255.255.255.0
- Gateway address (the firewall)—192.168.0.1

These addresses are part of the IETF-designated private address range for use in private networks.

## **Configuring Windows 95, 98, and ME for TCP/IP Networking**

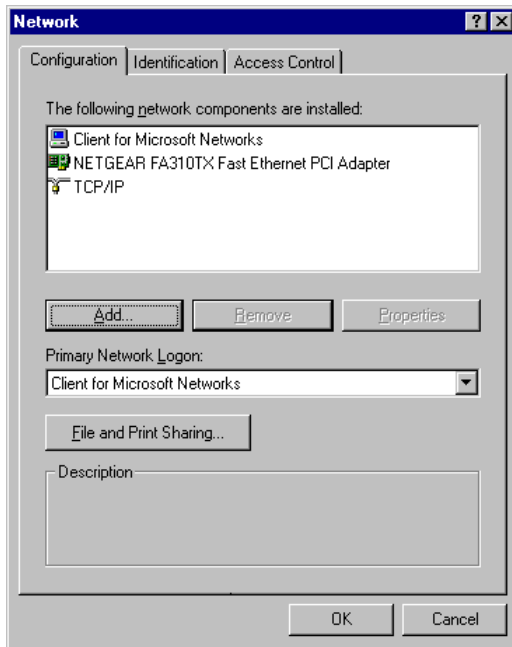
As part of the PC preparation process, you need to manually install and configure TCP/IP on each networked PC. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

### **Install or Verify Windows Networking Components**

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network icon.

The Network window opens, which displays a list of installed components:



You must have an Ethernet adapter, the TCP/IP protocol, and Client for Microsoft Networks.



**Note:** It is not necessary to remove any other network components shown in the Network window in order to install the adapter, TCP/IP, or Client for Microsoft Networks.

If you need to install a new adapter, follow these steps:

- a. Click the Add button.
- b. Select Adapter, and then click Add.
- c. Select the manufacturer and model of your Ethernet adapter, and then click OK.

If you need TCP/IP:

- a. Click the Add button.
- b. Select Protocol, and then click Add.
- c. Select Microsoft.
- d. Select TCP/IP, and then click OK.

If you need Client for Microsoft Networks:

- a. Click the Add button.
  - b. Select Client, and then click Add.
  - c. Select Microsoft.
  - d. Select Client for Microsoft Networks, and then click OK.
3. Restart your PC for the changes to take effect.

### **Enabling DHCP to Automatically Configure TCP/IP Settings**

After the TCP/IP protocol components are installed, each PC must be assigned specific information about itself and resources that are available on its network. The simplest way to configure this information is to allow the PC to obtain the information from the internal DHCP server of the FR328S Firewall . To use DHCP with the recommended default addresses, follow these steps:

1. Connect all PCs to the firewall, then restart the firewall and allow it to boot.
2. On each attached PC, open the Network control panel (refer to the previous section) and select the Configuration tab.
3. From the components list, select TCP/IP->(your Ethernet adapter) and click Properties.
4. In the IP Address tab, select “Obtain an IP address automatically”.
5. Select the Gateway tab.
6. If any gateways are shown, remove them.
7. Click OK.
8. Restart the PC.

Repeat steps 2 through 8 for each PC on your network.

### **Selecting Windows' Internet Access Method**

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Internet Options icon.
3. Select “I want to set up my Internet connection manually” or “I want to connect through a Local Area Network” and click Next.
4. Select “I want to connect through a Local Area Network” and click Next.

5. Uncheck all boxes in the LAN Internet Configuration screen and click Next.
6. Proceed to the end of the Wizard.

### **Verifying TCP/IP Properties**

After your PC is configured and has rebooted, you can check the TCP/IP configuration using the utility *winiipcfg.exe*:

1. On the Windows taskbar, click the Start button, and then click Run.
2. Type `winiipcfg`, and then click OK.

The IP Configuration window opens, which lists (among other things), your IP address, subnet mask, and default gateway.

3. From the drop-down box, select your Ethernet adapter.

The window is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that NETGEAR recommends:

- The IP address is between 192.168.0.2 and 192.168.0.254
- The subnet mask is 255.255.255.0
- The default gateway is 192.168.0.1

## **Configuring Windows NT, 2000 or XP for IP Networking**

As part of the PC preparation process, you need to manually install and configure TCP/IP on each networked PC. Before starting, locate your Windows CD; you may need to insert it during the TCP/IP installation process.

### **Install or Verify Windows Networking Components**

To install or verify the necessary components for IP networking:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network and Dialup Connections icon.
3. If an Ethernet adapter is present in your PC, you should see an entry for Local Area Connection. Double-click that entry.
4. Select Properties.

5. Verify that 'Client for Microsoft Networks' and 'Internet Protocol (TCP/IP)' are present. If not, select Install and add them.
6. Select 'Internet Protocol (TCP/IP)', click Properties, and verify that "Obtain an IP address automatically" is selected.
7. Click OK and close all Network and Dialup Connections windows.
8. Make sure your PC is connected to the firewall, then reboot your PC.

### Verifying TCP/IP Properties

To check your PC's TCP/IP configuration:

1. On the Windows taskbar, click the Start button, and then click Run.

The Run window opens.

2. Type `cmd` and then click OK.

A command window opens

3. Type `ipconfig /all`

Your IP Configuration information will be listed, and should match the values below if you are using the default TCP/IP settings that NETGEAR recommends:

- The IP address is between 192.168.0.2 and 192.168.0.254
- The subnet mask is 255.255.255.0
- The default gateway is 192.168.0.1

4. Type `exit`

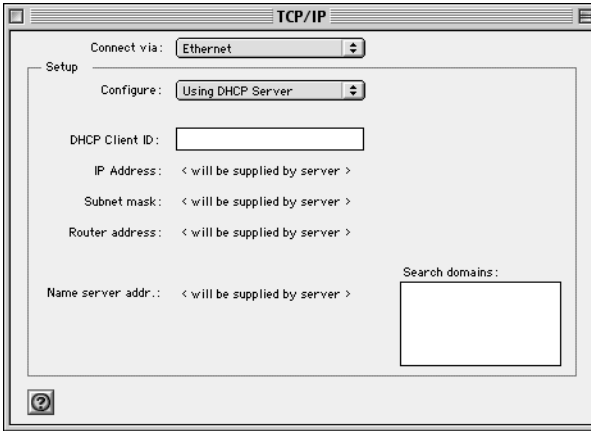
### Configuring the Macintosh for TCP/IP Networking

Beginning with Macintosh Operating System 7, TCP/IP is already installed on the Macintosh. On each networked Macintosh, you will need to configure TCP/IP to use DHCP.

#### MacOS 8.6 or 9.x

1. From the Apple menu, select Control Panels, then TCP/IP.

The TCP/IP Control Panel opens:



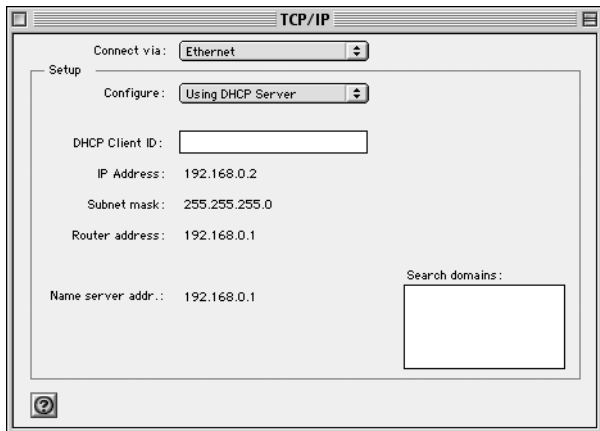
2. From the “Connect via” box, select your Macintosh’s Ethernet interface.
3. From the “Configure” box, select Using DHCP Server.  
You can leave the DHCP Client ID box empty.
4. Close the TCP/IP Control Panel.
5. Repeat this for each Macintosh on your network.

## MacOS X

1. From the Apple menu, choose System Preferences, then Network.
2. If not already selected, select Built-in Ethernet in the Configure list.
3. If not already selected, Select Using DHCP in the TCP/IP tab.
4. Click Save.

## Verifying TCP/IP Properties for Macintosh Computers

After your Macintosh is configured and has rebooted, you can check the TCP/IP configuration by returning to the TCP/IP Control Panel. From the Apple menu, select Control Panels, then TCP/IP.



The panel is updated to show your settings, which should match the values below if you are using the default TCP/IP settings that NETGEAR recommends:

- The IP Address is between 192.168.0.2 and 192.168.0.254
- The Subnet mask is 255.255.255.0
- The Router address is 192.168.0.1

If you do not see these values, you may need to restart your Macintosh or you may need to switch the “Configure” setting to a different option, then back again to “Using DHCP Server”.



## Verifying the Readiness of Your Internet Account

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For broadband access to the Internet, you need to contract with an Internet service provider (ISP) for a single-user Internet access account using a cable modem or DSL modem. This modem must be a separate physical box (not a card) and must provide an Ethernet port intended for connection to a Network Interface Card (NIC) in a computer. Your firewall does not support a USB-connected broadband modem.

For a single-user Internet account, your ISP supplies TCP/IP configuration information for one computer. With a typical account, much of the configuration information is dynamically assigned when your PC is first booted up while connected to the ISP, and you will not need to know that dynamic information.

In order to share the Internet connection among several computers, your firewall takes the place of the single PC, and you need to configure it with the TCP/IP information that the single PC would normally use. When the firewall's Internet port is connected to the broadband modem, the firewall appears to be a single PC to the ISP. The firewall then allows the PCs on the local network to masquerade as the single PC to access the Internet through the broadband modem. The method used by the firewall to accomplish this is called Network Address Translation (NAT) or IP masquerading.

### Are Login Protocols Used?

Some ISPs require a special login protocol, in which you must enter a login name and password in order to access the Internet. If you normally log in to your Internet account by running a program such as WinPOET or EnterNet, then your account uses PPP over Ethernet (PPPoE).

When you configure your router, you will need to enter your login name and password in the router's configuration menus. After your network and firewall are configured, the firewall will perform the login task when needed, and you will no longer need to run the login program from your PC. It is not necessary to uninstall the login program.

### What Is Your Configuration Information?

More and more, ISPs are dynamically assigning configuration information. However, if your ISP does not dynamically assign configuration information but instead used fixed configurations, your ISP should have given you the following basic information for your account:

- An IP address and subnet mask
- A gateway IP address, which is the address of the ISP's router
- One or more domain name server (DNS) IP addresses
- Host name and domain suffix

For example, your account's full server names may look like this:

`mail.xxx.yyy.com`

In this example, the domain suffix is `xxx.yyy.com`.

If any of these items are dynamically supplied by the ISP, your firewall automatically acquires them.

If an ISP technician configured your PC during the installation of the broadband modem, or if you configured it using instructions provided by your ISP, you need to copy the configuration information from your PC's Network TCP/IP Properties window or Macintosh TCP/IP Control Panel before reconfiguring your PC for use with the firewall. These procedures are described next.

### **Obtaining ISP Configuration Information for Windows Computers**

As mentioned above, you may need to collect configuration information from your PC so that you can use this information when you configure the FR328S Firewall. Following this procedure is only necessary when your ISP does not dynamically supply the account information.

To get the information you need to configure the firewall for Internet access:

1. On the Windows taskbar, click the Start button, point to Settings, and then click Control Panel.
2. Double-click the Network icon.

The Network window opens, which displays a list of installed components.

3. Select TCP/IP, and then click Properties.

The TCP/IP Properties dialog box opens.

4. Select the IP Address tab.

If an IP address and subnet mask are shown, write down the information. If an address is present, your account uses a fixed (static) IP address. If no address is present, your account uses a dynamically-assigned IP address. Click "Obtain an IP address automatically".

5. Select the Gateway tab.

If an IP address appears under Installed Gateways, write down the address. This is the ISP's gateway address. Select the address and then click Remove to remove the gateway address.

6. Select the DNS Configuration tab.

If any DNS server addresses are shown, write down the addresses. If any information appears in the Host or Domain information box, write it down. Click Disable DNS.

7. Click OK to save your changes and close the TCP/IP Properties dialog box.

You are returned to the Network window.

8. Click OK.

9. Reboot your PC at the prompt. You may also be prompted to insert your Windows CD.

### **Obtaining ISP Configuration Information for Macintosh Computers**

As mentioned above, you may need to collect configuration information from your Macintosh so that you can use this information when you configure the FR328S Firewall . Following this procedure is only necessary when your ISP does not dynamically supply the account information.

To get the information you need to configure the firewall for Internet access:

1. From the Apple menu, select Control Panels, then TCP/IP.

The TCP/IP Control Panel opens, which displays a list of configuration settings. If the "Configure" setting is "Using DHCP Server", your account uses a dynamically-assigned IP address. In this case, close the Control Panel and skip the rest of this section.

2. If an IP address and subnet mask are shown, write down the information.
3. If an IP address appears under Router address, write down the address. This is the ISP's gateway address.
4. If any Name Server addresses are shown, write down the addresses. These are your ISP's DNS addresses.
5. If any information appears in the Search domains information box, write it down.
6. Change the "Configure" setting to "Using DHCP Server".
7. Close the TCP/IP Control Panel.

## Restarting the Network

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Once you've set up your computers to work with the firewall, you must reset the network for the devices to be able to communicate correctly. Restart any computer that is connected to the firewall.

After configuring all of your computers for TCP/IP networking and restarting them, and connecting them to the local network of your FR328S Firewall , you are ready to access and configure the firewall.

# Glossary

Use the list below to find definitions for technical terms used in this manual.

## **10BASE-T**

IEEE 802.3 specification for 10 Mbps Ethernet over twisted pair wiring.

## **100BASE-Tx**

IEEE 802.3 specification for 100 Mbps Ethernet over twisted pair wiring.

## **Access Control List (ACL)**

An ACL is a database that an Operating System uses to track each user's access rights to system objects (such as file directories and/or files).

## **ADSL**

Short for asymmetric digital subscriber line, a technology that allows data to be sent over existing copper telephone lines at data rates of from 1.5 to 9 Mbps when receiving data (known as the downstream rate) and from 16 to 640 Kbps when sending data (known as the upstream rate). ADSL requires a special ADSL modem. ADSL is growing in popularity as more areas around the world gain access.

## **ARP**

Address Resolution Protocol, a TCP/IP protocol used to convert an IP address into a physical address (called a DLC address), such as an Ethernet address. A host wishing to obtain a physical address broadcasts an ARP request onto the TCP/IP network. The host on the network that has the IP address in the request then replies with its physical hardware address. There is also Reverse ARP (RARP) which can be used by a host to discover its IP address. In this case, the host broadcasts its physical address and a RARP server replies with the host's IP address.

## **Auto Uplink**

Auto Uplink™ technology (also called MDI/MDIX) eliminates the need to worry about crossover vs. straight-through Ethernet cables. Auto Uplink™ will accommodate either type of cable to make the right connection.

## **Bandwidth**

The information capacity, measured in bits per second, that a channel could transmit. Bandwidth examples include 10 Mbps for Ethernet, 100 Mbps for Fast Ethernet, and 1000 Mbps (1 Gbps) for Gigabit Ethernet.

## **Baud**

The signaling rate of a line, that is, the number of transitions (voltage or frequency changes) made per second. Also known as line speed.

### **Broadcast**

A packet sent to all devices on a network.

### **Class of Service**

A term to describe treating different types of traffic with different levels of service priority. Higher priority traffic gets faster treatment during times of switch congestion

### **Cat 5**

Category 5 unshielded twisted pair (UTP) cabling. An Ethernet network operating at 10 Mbits/second (10BASE-T) will often tolerate low quality cables, but at 100 Mbits/second (10BASE-Tx) the cable must be rated as Category 5, or Cat 5 or Cat V, by the Electronic Industry Association (EIA). This rating will be printed on the cable jacket. Cat 5 cable contains eight conductors, arranged in four twisted pairs, and terminated with an RJ45 type connector. In addition, there are restrictions on maximum cable length for both 10 and 100 Mbits/second networks.

### **DHCP**

An Ethernet protocol specifying how a centralized DHCP server can assign network configuration information to multiple DHCP clients. The assigned information includes IP addresses, DNS addresses, and gateway (router) addresses.

### **DMZ**

Specifying a Default DMZ Server allows you to set up a computer or server that is available to anyone on the Internet for services that you haven't defined. There are security issues with doing this, so only do this if you'll willing to risk open access.

### **DNS**

Short for Domain Name System (or Service), an Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name `www.example.com` might translate to `198.105.232.4`. The DNS system is, in fact, its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

### **Domain Name**

A descriptive name for an address or group of addresses on the Internet. Domain names are of the form of a registered entity name plus one of a number of predefined top level suffixes such as `.com`, `.edu`, `.uk`, etc. For example, in the address `mail.NETGEAR.com`, `mail` is a server name and `NETGEAR.com` is the domain.

### **DSL**

Short for digital subscriber line, but is commonly used in reference to the asymmetric version of this technology (ADSL) that allows data to be sent over existing copper telephone lines at data rates of from 1.5 to 9 Mbps when receiving data (known as the downstream rate) and from 16 to 640 Kbps when sending data

(known as the upstream rate). ADSL requires a special ADSL modem. ADSL is growing in popularity as more areas around the world gain access.

### **DSLAM**

DSL Access Multiplexor. The piece of equipment at the telephone company central office that provides the ADSL signal.

### **Dynamic Host Configuration Protocol**

DHCP. An Ethernet protocol specifying how a centralized DHCP server can assign network configuration information to multiple DHCP clients. The assigned information includes IP addresses, DNS addresses, and gateway (router) addresses.

### **Ethernet**

A LAN specification developed jointly by Xerox, Intel and Digital Equipment Corporation. Ethernet networks transmit packets at a rate of 10 Mbps.

### **Gateway**

A local device, usually a router, that connects hosts on a local network to other networks.

### **ICMP**

See “Internet Control Message Protocol”

### **IEEE**

Institute of Electrical and Electronics Engineers. This American organization was founded in 1963 and sets standards for computers and communications.

### **IETF**

Internet Engineering Task Force. An organization responsible for providing engineering solutions for TCP/IP networks. In the network management area, this group is responsible for the development of the SNMP protocol.

### **Internet Control Message Protocol**

ICMP is an extension to the Internet Protocol (IP) that supports packets containing error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.

### **Internet Protocol**

The method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it among all other computers on the Internet. When you send or receive data (for example, an e-mail note or a Web page), the message gets divided into little chunks called packets. Each of these packets contains both the sender's Internet address and the receiver's address. Any packet is sent first to a gateway computer that understands a small part of the Internet. The gateway computer reads the destination address and forwards the packet to an adjacent gateway that in turn reads the destination address and so forth across the Internet until one gateway

recognizes the packet as belonging to a computer within its immediate neighborhood or domain. That gateway then forwards the packet directly to the computer whose address is specified.

Because a message is divided into a number of packets, each packet can, if necessary, be sent by a different route across the Internet. Packets can arrive in a different order than they were sent. The Internet Protocol just delivers them. It's up to another protocol, the Transmission Control Protocol (TCP) to put them back in the right order. IP is a connectionless protocol, which means that there is no continuing connection between the end points that are communicating. Each packet that travels through the Internet is treated as an independent unit of data without any relation to any other unit of data. (The reason the packets do get put in the right order is because of TCP, the connection-oriented protocol that keeps track of the packet sequence in a message.) In the Open Systems Interconnection (OSI) communication model, IP is in Layer 3, the Networking Layer. The most widely used version of IP today is IP version 4 (IPv4). However, IP version 6 (IPv6) is also beginning to be supported. IPv6 provides for much longer addresses and therefore for the possibility of many more Internet users. IPv6 includes the capabilities of IPv4 and any server that can support IPv6 packets can also support IPv4 packets.

## **IP**

See "Internet Protocol"

## **IP Address**

A four-byte number uniquely defining each host on the Internet, usually written in dotted-decimal notation with periods separating the bytes (for example, 134.177.244.57). Ranges of addresses are assigned by Internic, an organization formed for this purpose.

## **ISP**

Internet service provider.

## **LAN**

See "Local Area Network"

## **Local Area Network**

A communications network serving users within a limited area, such as one floor of a building. A LAN typically connects multiple personal computers and shared network devices such as storage and printers. Although many technologies exist to implement a LAN, Ethernet is the most common for connecting personal computers and is limited to a distance of 1,500 feet. LANs can be connected together, but if modems and telephones connect two or more LANs, the larger network constitutes what is called a WAN or Wide Area Network.

## **MAC**

(1) Medium Access Control. In LANs, the sublayer of the data link control layer that supports medium-dependent functions and uses the services of the physical layer to provide services to the logical link control (LLC) sublayer. The MAC sublayer includes the method of determining when a device has access to the transmission medium. (2) Message Authentication Code. In computer security, a value that is a part of a message or accompanies a message and is used to determine that the contents, origin, author, or other attributes of all or part of the message are as they appear to be. (*IBM Glossary of Computing Terms*)



**MAC address**

The Media Access Control address is a unique 48-bit hardware address assigned to every network interface card. Usually written in the form 01:23:45:67:89:ab.

**Maximum Receive Unit**

The size in bytes of the largest packet that can be sent or received.

**Maximum Transmit Unit**

The size in bytes of the largest packet that can be sent or received.

**Mbps**

Megabits per second.

**MDI/MDIX**

In cable wiring, the concept of transmit and receive are from the perspective of the PC, which is wired as a Media Dependant Interface (MDI). In MDI wiring, a PC transmits on pins 1 and 2. At the hub, switch, router, or access point, the perspective is reversed, and the hub receives on pins 1 and 2. This wiring is referred to as Media Dependant Interface - Crossover (MDI-X).

**MTU**

The size in bytes of the largest packet that can be sent or received.

**packet**

A block of information sent over a network. A packet typically contains a source and destination network address, some protocol and length information, a block of data, and a checksum.

**Point-to-Point Protocol**

PPP. A protocol allowing a computer using TCP/IP to connect directly to the Internet.

**PPP**

A protocol allowing a computer using TCP/IP to connect directly to the Internet.

**PPPoA**

PPPoA. PPP over ATM is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

**PPPoE**

PPPoE. PPP over Ethernet is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

**PPP over ATM**

PPPoA. PPP over ATM is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

### **PPP over Ethernet**

PPPoE. PPP over Ethernet is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

### **PPTP**

Point-to-Point Tunneling Protocol. A method for establishing a virtual private network (VPN) by embedding Microsoft's network protocol into Internet packets.

### **Protocol**

A set of rules for communication between devices on a network.

### **PSTN**

Public Switched Telephone Network.

### **QoS**

See "Quality of Service"

### **Quality of Service**

QoS is a networking term that specifies a guaranteed level of throughput. Throughput is the amount of data transferred from one device to another or processed in a specified amount of time - typically, throughputs are measured in bytes per second (Bps).

### **RFC**

Request For Comment. Refers to documents published by the Internet Engineering Task Force (IETF) proposing standard protocols and procedures for the Internet. RFCs can be found at [www.ietf.org](http://www.ietf.org).

### **router**

A device that forwards data between networks. An IP router forwards data based on IP source and destination addresses.

### **Segment**

A section of a LAN that is connected to the rest of the network using a switch, bridge, or repeater.

### **Subnet Mask**

Combined with the IP address, the IP Subnet Mask allows a device to know which other addresses are local to it, and which must be reached through a gateway or router.

### **TCP/IP**

The main internetworking protocols used in the Internet. The Internet Protocol (IP) used in conjunction with the Transfer Control Protocol (TCP) form TCP/IP.

### **UTP**

Unshielded twisted pair is the cable used by 10BASE-T and 100BASE-Tx Ethernet networks.

**WAN**

See “Wide Area Network”

**Web**

Also known as World-Wide Web (WWW) or W3. An Internet client-server system to distribute information, based upon the hypertext transfer protocol (HTTP).

**WEB Proxy Server**

A Web proxy server is a specialized HTTP server that allows clients access to the Internet from behind a firewall. The proxy server listens for requests from clients within the firewall and forwards these requests to remote Internet servers outside the firewall. The proxy server reads responses from the external servers and then sends them to internal client clients.

**Wide Area Network**

A WAN is a computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).

**Windows Internet Naming Service**

WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses. If a remote network contains a WINS server, your Windows PCs can gather information from that WINS server about its local hosts. This allows your PCs to browse that remote network using the Windows Network Neighborhood feature.

**WINS**

WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses.



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